AN ABSTRACT OF THE THESIS OF

<u>Abby L. Nickels</u> for the degree of
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Title: <u>An Exploration of Visitors' Conservation Attitudes, Expectations, and</u>
<u>Motivations at Three Informal Education Institutions in Newport, Oregon</u>.

Abstract approved:

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Shawn Rowe

Due to the overwhelming concern for the current state of our oceans, The Pew Ocean

Commission (2003) and the U.S. Commission on Ocean policy (2004), have both

strongly recommended an increase in our society's ocean literacy. An increase in

ocean literacy can be achieved through informal education institutions such as zoos,

aquarium and science centers. Informal science education institutions are places

where visitors engage in free-choice learning on their own terms; having varying

amounts of choice over when, how, and with whom they learn. In order to understand

whether or not aquarium, zoos, and science centers have an impact on visitors in terms

of learning researchers need to be able to document the learning that occurs there. The

goal of this study was to explore some newly published tools for understanding what

visitors bring with them when visiting informal education institutions. This study

looked at visitor motivations, conservation attitudes, and perceptions of a visit to three

informal education institutions in Newport, Oregon. It also investigated the

effectiveness of using these newly published tools outside of the realm from which

they were created. Results of the three administered surveys at each institution revealed that the motivations of visitors to informal education institutions change seasonally. In addition visitor's conservation attitudes significantly increased from pre to post visit. The findings also revealed that the motivations tool, which was created specifically to measure visitor motivations in zoo and aquariums, was able to successfully measure visitor motivations in such places as a science center and boat excursion company.

An Exploration of Visitors' Conservation Attitudes, Expectations, and Motivations at
Three Informal Education Institutions in Newport, Oregon

by
Abby L. Nickels

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APPROVED

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Dean of the Graduate School

I understand that my thesis will become part of the permanent collection of Oregon State University libraries. My signature below authorizes release of my thesis to any reader upon request.

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Abby L. Nickels, Author

ACKNOWLEDGEMENTS

CONTRIBUTION OF AUTHORS

Dr. Shawn Rowe assisted with the interpretation of the data and was involved with the design and writing of the second manuscript.

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Introduction

Oceans make up the majority of our world, and most people have very little understanding of the role the oceans play in our everyday lives. Given the declining quality of our oceans due to factors such as climate change, pollution, and fisheries collapse, it is essential for the public to understand their connections to these crises. Due to the overwhelming scientific concern for the future of the oceans, The Pew Oceans Commission (2003) and the U.S. Commission on Ocean Policy (2004) published reports strongly recommending an increase in ocean literacy. Ocean literacy is defined as an understanding of the ocean's influences on people and people's influences on the ocean. Basic to the idea of ocean literacy is the belief that understanding the ocean is integral to understanding the planet on which we live and that this understanding is essential to sustaining our planet and our own well-being.

For many years, school core curricula for grades K-12 have not included ocean topics. In fact, in some cases, the ocean has been completely ignored in formal K-12 education (Cava et. al., 2005). Though this lack of ocean literacy and marine education is beginning to improve in some areas on the school level, there needs to be a source for broad ocean literacy outside the classroom in order to increase the overall ocean literacy of society. It has been suggested that an alternate way to inform the public about the marine environment is through informal education. Informal education can be defined as education which takes place outside of the classroom and can occur in afterschool programs, museums, zoos and aquariums, hobbies, educational TV and so forth. Informal education institutions support what is called free-choice learning. Free-choice learning is the most dominant form of learning and

is defined as learning that is self-directed, voluntary, and guided by the individual's needs and interests (Falk and Dierking, 2002). People of all ages participate in free-choice learning through various mediums such as museums, aquariums, zoos, and interpretative state park programs. In addition, more than 150 million visitors visit zoos and aquariums every year, reaching more people than the annual attendance of all NFL, NHL, MLB and NBA games combined (AZA, 2008). People in US society are seeking out not just any experience on their leisure time, but one that is ostensibly also educational. This could reflect the theory that our society is inevitably changing from an industrial-based economy to a knowledge based economy, where lifelong and free-choice learning is becoming fundamental, and learning itself has both tangible and intangible value (Packer and Ballatyne, 2002; Falk and Dierking, 2000).

Study Purpose

Museums, science centers, aquariums, and similar informal settings provide a variety of unique, engaging experiences that cannot be readily obtained elsewhere in society (Briseño-Garzón et. al, 2007). These places are considered to be informal science education institutions and considered places where visitors engage in free-choice learning on their terms; having varying amounts of choice over when, how, and with whom they learn. In order to understand whether or not aquarium, zoos, and science centers have an impact on visitors in terms of learning we need to be able to document the unique kinds of learning that occur there. Learning in museums and other informal education institutions has been revealed to be a relative and constructive process (Falk and Dierking, 2000; Hein, 1998; Hooper-Greenhill, et. al., 1994). This process is a

continuous, highly personal process. Learning in these sites has to be seen as a highly contextual process; the learner's prior knowledge, experience, interests, and motivations all comprise a personal context which interacts with the physical and sociocultural contexts to shape learning (Falk and Dierking, 2002). Learning in and from museums is not just about what the museum has to teach a visitor, but also includes what meaning the visitors choose to make of the museum experience (Falk, Dierking and Adams 2006). Moreover, visitors come to museums/aquariums, not as "blank slates", but with varying past experiences, cultures and backgrounds which in turn drive motivations for visiting free-choice learning institutions as well as the behavior that occurs inside those institutions. Therefore, understanding free-choice learning in informal science education institutions means understanding what visitors bring with them to the experience and what motivates their visit in addition to understanding the meaning making they do while they are there.

The goal of this study was to explore some newly published tools for understanding what visitors bring with them when visiting informal education institutions. I specifically set out to 1) utilize the newly published AZA toolkit to provide the Oregon Coast Aquarium with baseline data on visitor motivations, visitors' pre-existing and gained conservation-related knowledge, and attitudes and overall perceptions of a visit to the Oregon Coast Aquarium and 2) utilize the motivations survey from the AZA toolkit to further evaluate and compare motivations of visitors at three informal marine education sites in Newport, Oregon.

Study Context

Part 1: OCA Internship

This project was completed in two parts. The first part of the study was an Oregon Coast Aquarium (OCA) funded internship for a Marine Resource Management (MRM) student. The internship follows two other MRM OCA funded projects reported on in Gehrke (2007) and Hodak (2008). The internship provided an opportunity to gain experience in marine education and visitor evaluation processes in an AZA accredited institution. As part of the internship, I created a three-phase evaluation plan to provide the OCA with baseline data on visitor motivations, visitors' pre-existing and gained conservation-related knowledge, and attitudes toward and overall perceptions of a visit to the OCA. The data for this evaluation was collected July 15-September 1st 2007. This time period was chosen primarily due to the fact that it is the peak visitor season for the Oregon Coast Aquarium.

The Oregon Coast Aquarium evaluation plan was developed based on the 2007 report "Why Zoos and Aquariums Matter: Assessing the Impact of a Visit to a Zoo or Aquarium" (Falk et. al. 2007). Visitor research across the United States shows that there is an information deficit with regards to visitor motivations and what impacts zoos and aquariums have on conservation-related knowledge and affect. In 2004 The Association of Zoos and Aquariums (AZA) formed a strategic partnership with the Institute for Learning Innovation (ILI) and the Monterey Bay Aquarium and undertook a three year, nationwide study to assess the impacts of a zoo and aquarium visit on adults. As a result of that study, the AZA produced the "Visitor Impact Toolkit," which is a series of evaluation tools that can be used to better understand visitors. The

toolkit was distributed to AZA accredited institutions on CD in summer of 2007. This project was planned and developed before the CDs were distributed. The following tools from the Impact toolkit were used for this evaluation: Phase I: Identity-related Visitor motivational Categories instrument, Phase II: Conservation Affect instrument, Phase III: Concept Mapping.

Part 2: Motivations survey

The second part of the study was developed as a type of beta test of one of the most promising of the AZA tools. I was interested particularly in whether the motivations instrument could be used to characterize different visiting groups to different institutions. Would it reveal differences in audience motivations that might be useful for educators, marketing and curators at different sites? Would it help answer questions about differences and similarities among visitor groups to informal marine education institutions? I was also interested in whether the motivation tool would reveal seasonal differences among visitors. To start answering these questions, the motivation survey was used to document motivations of visitors across three informal marine education institutions in Newport, Oregon: Oregon Coast Aquarium (OCA), Hatfield Marine Science Center (HMSC) and Marine Discovery Tours (MDT). Data collection for this part of the study occurred from February-March 2008. This time period is considered winter/spring visitorship for all three sites. Motivation data for OCA summer audience had already been collected as part of Part 1 of the study the previous summer.

Methods/Procedures

Several different procedures were used in both studies. While the details will be

examined in more depth in each of the two manuscripts that make up the thesis, this

section outlines the methods of data collection for each instrument.

Conservation Attitude Survey– Used in Part 1

An exit survey was done to determine visit effect on conservation attitudes.

Following procedures outlined in the AZA toolkit, visitors were asked to respond to a

series of 13 statements and indicate, on a seven-point Likert-type scale, their

agreement with each of the statements. Statements related to 1) their attitudes toward

conservation, 2) their perceived ability to effect change, and 3) the role the Oregon

Coast Aquarium plays in promoting conservation. Following AZA toolkit instructions,

the visitors were also asked to reflect on how they perceived they would have

answered the 13 statements before their visit to the Oregon Coast Aquarium (as a

retrospective-pre survey). In addition, demographic data such as age, gender and

educational background was also collected. Survey sites were set up at the exit of the

Aquarium.

Concepts Maps – Used in Part 1

Concept maps were used to begin to document visitors' prior knowledge of

and interests in aquariums as well as visitors' overall expectations of the Oregon Coast

Aquarium. Before entering the aquarium, visitors were asked to write down as many

images, thoughts, words, phrases and pictures that came to mind when given the

prompt "Visit to the Oregon Coast Aquarium." They were then asked to draw lines between these concepts to show how they related and to write words between the concepts to explain how they linked to each other. Upon exiting, the same visitors were asked to repeat the same task as before on a new sheet of paper. Demographic data such as age, gender, and educational background was also collected. The data collection site was set up at the entrance and exit to the Oregon Coast Aquarium. A small "thank you" gift was given to participants who completed both parts of the survey.

Motivations Survey – Used in Part 1 and Part 2

Surveys were used to determine visitor motivations and create a meaningful categorization of visitors based on their knowledge, interests, beliefs, attitudes, behaviors and motivations. Following procedures outlined in both Falk, et al. 2007 and the AZA toolkit, the visitor selected five statements from a list of 20 that best explained why they chose to visit the specific institution on that particular day. They then ranked each of the selected statements for its importance to them using a seven-point Likert-type scale.

For Part 1 of this study, questionnaires were given to randomly selected visitors at several pre-determined locations at the Oregon Coast Aquarium. Every fifth adult that crossed a pre-determined imaginary line was approached to take the survey. Demographic data such as age, gender, and educational background was also collected.

For Part 2 of this study, at OCA and HMSC unmanned tables were set up and placed in the entry way of the institutions, and survey completion was voluntary. Each

table setup consisted of a sign stating survey and survey title, two boxes which contained blank surveys and completed surveys, and instructions for filling out the survey. At the MDT, surveys were voluntary and were administered to visitors while they waited to board the boat tour.

Participants

Part 1: OCA evaluation

Included with all three types of AZA visitor surveys (visitor motivations, conservation attitudes, and concept maps) were questions about visitor demographics such as age, gender and educational background. Questionnaires were given to randomly selected visitors at several pre-determined locations at the Oregon Coast Aquarium. Every fifth adult (anyone over 18) who crossed a pre-determined imaginary line was approached to take the survey. The total sample size for the demographic data was 324. Three kinds of demographic data are reported on in Figure 1 below. The first is gender, the second is group type (whether participants visited as part of a multigenerational group – often with children – or as a peer group), and reported educational attainment. Notice that no one reported visiting OCA as an individual, that females outnumber males, and that many of the participants report some college or higher.

Figure 1: Demographic data of visitors to the OCA in Summer 2007 (AZA toolkit evaluation.)
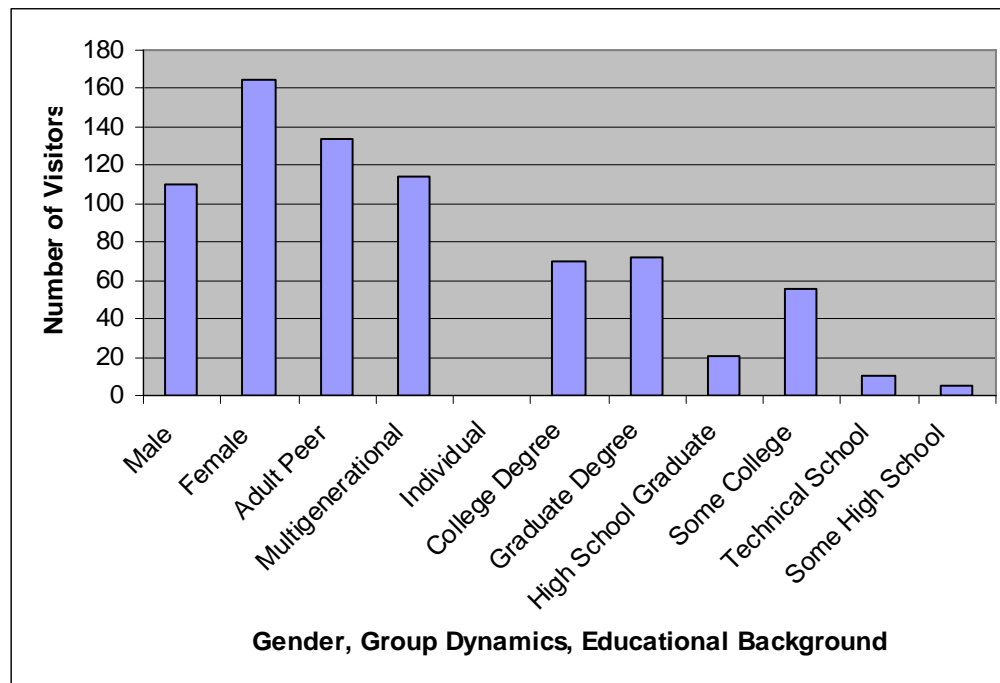
Part 2: Motivations Survey at 3 free-choice learning institutions in Newport, Oregon.

At all three sites, all adult visitors over the age of 18 were invited to complete the survey. The total sample size for demographic data was 344.

Table 1: Demographic data of visitors to three free-choice learning institutions in Newport, Oregon. (Motivations Survey).

Demographics: (number of visitors)	OCA (n=139)	HMSC (n = 113)	MDT (n =92)
Gender:			
Male	42	23	32
Female	93	87	58
No Answer	4	3	2
Group Dynamics:			
Adult Peer	67	31	37
Multigenerational	60	77	50
Individual	8	2	2
No Answer	4	3	3
Educational			

Background:			
College Degree	49	47	30
Graduate Degree	37	21	27
High School Graduate	7	5	8
Some College	29	31	21
Technical School	6	0	3
Some High School	4	3	1
No Answer	7	6	2

From analyzing the demographic data there seems to be an evidently high education level at both OCA and HMSC. In 2007, twenty-nine percent of people in the United States and twenty-five percent of people in Oregon reported to have completed a college degree or higher (www.census.gov); however, OCA and HMSC visitors report being much more highly educated than the general population, with almost 80% of respondents at HMSC reporting higher than a bachelors' degree. There is a possibility of visitors over-reporting, but the educational background data seems to be consistent with past data collected at both sites (Hodak, 2008; Phipps, 2007).

Another demographic trend that was noticed was the large amount of female participants in all the samples. This could be due to the fact that females are more willing to fill out surveys; however, even when I was conducting random sampling in the summer of 2007 at the OCA, men only accounted for forty percent of the participants. Thus another reason for the increased numbers of females could be due to the fact the audiences at the three sites are primarily female.

Theoretical Constructs

It is a commonplace claim of constructivists of all kinds working in museums and other informal learning settings (Hein, 1998; Rowe, 1998) that learning is shaped by

the knowledge people bring with them into a learning situation. But prior knowledge is only part of the story. Three additional theoretical constructs that help understand how learning could be shaped by what people bring with them into the experience underlie my work: 1) conservation attitude, 2) expectation and 3) motivation.

Conservation attitudes

Museums, aquaria, national parks, science centers and zoos are important public learning institutions. Recent studies have shown that visitors to zoos and aquariums are somewhat more knowledgeable and interested about conservation than the general public (Dierking et. al., 2002). There are a number of studies that support the conclusion that individual zoos and aquariums do have positive impact in the form of learning outcomes for their visitors (Doering 1992; Swanagan 2000). However, these studies tend to be limited in scope and not easily generalized. Researchers have also documented forces that shape how people relate to the natural world (Price, Ashmore, and McGivern, 1994), but there is a deficit of information on the impact of a zoo or aquarium visit on conservation-related attitudes and knowledge. Because visits to zoos and aquariums may be some of the most memorable and important conservation-related learning experiences for people, there is a critical need to collect more data regarding the impact that zoos and aquariums have on visitors' conservation related behavior.

Conservation attitude can be defined as someone's personal disposition toward conservation related issues. Visitors can have varying feelings and knowledge regarding conservation and conservation issues, which in turn, will shape their attitudes towards the subject matter. The conservation survey published in the AZA

toolkit was designed to measure the visitor's level of agreement with statements that related to their attitudes towards 1) conservation; 2) their ability to effect change; and 3) the role played by zoos and aquariums in promoting conservation (Falk et. al., 2007).

Expectations

How do people's expectations shape what they might learn and how do we document those expectations? Doering and Karns (1999) found that visitors to a museum are likely to enter the museum with a self-reinforcing "entry narrative." The entry narrative is based on the concept that museum visitors are not "blank slates" when they arrive at a museum; they, in fact, visit a museum with an entrance narrative. The entry narrative has three components: 1) A basic framework or fundamental way that individuals construct and contemplate the world 2) information about the given content area topic-organized according to that basic framework 3) personal experiences, emotions, and memories that verify and support this understanding (Doering & Pekarik, 1996). The entry narrative directs the visitor's learning and behaviors at the museum. In addition, Doering and Pekarik state that visitors' perceptions of satisfaction will be directly related to the experiences that resonate with their entering narrative.

But how can one document things like entry narratives without engaging in significant ethnographic research with visitors? Out of concern over the ecological validity of traditional assessment approaches based on research on learning in classrooms, many museum researchers have called for new tools based on research in

museums themselves. New assessment tools, such as concept maps and personal meaning mapping, which are suggested by constructivist education theories and used more or less widely in the informal education research field (Falk et al.1998, Falk and Adelman, 2003), may be useful for documenting both prior knowledge and experience as well as changes in knowledge and expectations.

While widely used in schools, concept mapping tools are used in very different ways in museums. Concept maps are hierarchical, node-link diagrams that are intended to represent meaningful relationships between concepts. These relationships are usually linked by words to form propositions that together make up an approximation of the structural complexity of a learner's understanding of a specific topic (Christensen, 2007). One of the strengths of concept maps as assessment tools in informal education settings is that they are more like learning activities than like exams, and they require surprisingly little training of visitors to complete them (Christensen, 2007; Rollins, 2007). The resulting maps are basic documents of what participants think of as important or salient at the moment of filling them out.

Concept mapping, however, is not ideal for in-depth analysis of knowledge and changes in knowledge. Early studies using concept maps eventually led to the development of a technique called personal meaning mapping (PMM) (Falk, 2003). The PMM is related to the more general concept map, and has been successfully used in free-choice learning settings (see Rebar, 2005 for a review). However, PMM does require interviewing the visitors, which can be limiting for large groups and is time consuming. Due to this fact, concept maps are often used instead. Concepts maps use the same theories and design as PPM, but exclude the interview process. This study

uses concept maps to document visitors' incoming expectations of a visit to the

Oregon Coast Aquarium as well as the ideas and concepts visitors leave with.

Motivations

      Following up the work on entry narratives, Falk (2006) postulates that these

entry narratives are types of what Gee (2001) calls "situated" identities. Falk further

postulates that they may be strongly related to a visitor's underlying motivations.

Identities used to be thought of as fixed personal characteristics like ethnic

background, socio-economic status, race, or gender, but current research in identity

and learning focuses on the dynamic, fluid and situated nature of identity (Gee, 2000;

Holland, 1998; Wertsch, 2002). From this larger perspective, identities can be thought

of as a confluence of internal and external factors (Holland 1998) that get "activated"

during particular activities, rather than being static, fixed, and causative. Therefore a

visitor to a zoo or aquarium doesn't just bring a generic identity to their visit; they

bring a zoo/aquarium "identity" to their visit, and the visit helps them to enact and,

therefore, build or reinforce that particular situated identity. This identity in turn

drives/molds their motivations for that specific visit. The motivations expressed

during a visit to a zoo or aquarium will directly impact how visitors conduct their visit

and what meaning they make from the experience. This study is a first step in

showing if and how the instrument published by AZA can in fact be used across

multiple sites to determine visitor motivations and characterize audiences. It therefore

provides support for further studies that might try to link incoming motivations with

activities and learning during a visit.

The Manuscripts

As of review of the table of contents shows, the first document, phase 1 of this study, focuses on the ability to use the newly published AZA toolkit on reporting baseline information to OCA regarding visitors' motivations, conservation attitudes and expectations. It was written as a report for OCA of the findings from the first phase of research that was undertaken as part of the internship described above. The second document, the second phase of this study, is an expansion of one of the AZA tools, the motivations survey. This document focuses on the ability to utilize the motivation survey outside of a zoo/aquarium setting and compares the visitor motivations of three different "marine based" free-choice learning institutions in Newport, Oregon. It has been written for submission to the journal *Visitors Studies,* which targets museum, evaluation, and informal education researchers as well as practitioners. The two manuscripts are followed by a general conclusion that draws general implications and findings from both papers.

An Evaluation of Motivations, Conservation Affect, and Expectations of a Visit to the
Oregon Coast Aquarium

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<u>Executive Summary</u>

The purpose of this evaluation, implemented from July - September of 2007, was to provide the Oregon Coast Aquarium with baseline data on visitor motivations, visitors' pre-existing and gained conservation-related knowledge and attitudes, and overall perceptions of a visit to the Oregon Coast Aquarium. A fundamental understanding of these characteristics will enable the Oregon Coast Aquarium to optimize its educational outcomes and ultimately have a better understanding of its visitors' attitudes and perceptions.

This evaluation is based on the methodologies from the Association of Zoos and Aquariums (AZA) "Visitor Impact Toolkit." The following instruments from the visitors impact toolkit were used for this study: Phase I: Identity-related Visitor Motivational Categories instrument, Phase II: Conservation Affect instrument, Phase III: Concept Mapping. Results from each phase of the study include:

Phase I, *Visitor Motivational Categories*:

- Visitors to the Oregon Coast Aquarium come with specific identity related motivations, and these motivations may shape the way they conduct their visit and what meaning they make from the experience. Forty-three percent of visitors indicated a clear dominant motivation. Nine percent of visitors were found to have a dual dominant motivation and thirty-four percent indicated a

single dominant identity related motivation for their aquarium visit. Fifty-seven percent indicated a non-dominant motivation.

Phase II, *Conservation Affect*:

- There is a positive change in conservation affect pre to post visit as measured by the AZA instrument: All three overarching categories: 1) Individual responsibility 2) Attitude toward zoos/aquariums and 3) Human protection of nature had a positive change from pre to post visit.

Phase III, *Concept Mapping*:

- Visitors come to the Oregon Coast Aquarium with expectations, captured here as a set of associations, about their visit and what they are going to see during their visit. However, when they leave, they tend to leave with added knowledge about Aquarium exhibit material as well as show evidence of shift in their associations with a visit to the Aquarium.

- Visitor specificity on concept maps (a measure of learning) increased significantly ($p < .05$) from pre-maps to post-maps.

- There was a significant increase ($p < .05$) on several categories on post maps related to the visit mentioned by visitors: exhibits, birds, crustaceans and facts learned.

Overall the evaluation was successful in terms of providing the Oregon Coast Aquarium with added insight on their visitors' entry motivations and incoming expectations and knowledge. However, there is considerable room for improvement in

the instruments used. For both the motivations survey and the conservation affect survey there is concern regarding their ability to measure changes.

The Oregon Coast Aquarium was an optimal location to try out the new tools due to the fact it was small and it was seeking discover more information about the Aquarium visitor. The aquarium was one of the institutions that participated in the data gathering that led to the development of the AZA toolkit as well. Though this study was small in scale, the implications and suggestions are promising towards assisting the Aquarium in optimizing its programming, exhibition messages, and educational outcomes as well as give the Aquarium a better understanding of visitors' perceptions and attitudes.   Lastly, there are specific recommendations for AZA and the toolkit developers that emerged from this first documented trial of the instruments.

Introduction

As part of a summer internship opportunity for gaining experience in marine education and visitor evaluation processes, a three-phase evaluation plan was created to provide the Oregon Coast Aquarium with baseline data on visitor motivations, visitors' conservation-related attitudes, and overall expectations of a visit to the Oregon Coast Aquarium. A fundamental understanding of these characteristics will enable the Oregon Coast Aquarium to optimize its educational outcomes and ultimately have a better understanding of its visitors' attitudes and perceptions.

The Oregon Coast Aquarium evaluation plan for this study was developed based on the 2007 report (Falk et. al. 2007): "Why Zoos and Aquariums Matter: Assessing the Impact of a Visit to a Zoo or Aquarium." The data for this evaluation was collected July 15-September 1st 2007 by Abby Nickels under the direction of Kerry Carlin-Morgan and Shawn Rowe. Abby Nickels is a graduate student at Oregon State University pursuing a Masters Degree in Marine Resource Management. In addition to the internship, the project was designed to "beta test" the tools that emerged from the Falk et. al. study. The results reported here will additionally become part of a master's thesis in the MRM program at Oregon State University.

Background

Zoos and Aquariums attract a highly diverse group of visitors. Research over the last three decades has established that age, educational background, prior knowledge, and past experiences in similar settings all shape the experiences visitors will have during a visit to a zoo or aquarium (Falk and Dierking, 2000.) In order for an aquarium or zoo to be an effective place to educate visitors, educational professionals need to know their visitors' characteristics to develop realistic learning objectives and expectations for changing conservation attitudes.

Visitor research across the United States shows that there is an information deficit with regards to visitor motivations and what impact zoos and aquariums have on conservation-related knowledge and affect. In 2004, The Association of Zoos and Aquariums (AZA) formed a strategic partnership with the Institute for Learning Innovation (ILI) and the Monterey Bay Aquarium to undertake a three year, nationwide study assessing the impacts of a zoo/aquarium visit on adults. In addition to the study, AZA produced the "Visitor Impact Toolkit," which is a series of evaluation tools that can be used to better understand visitors. The toolkit was distributed to AZA accredited institutions on CD in summer of 2007. The following tools from the Impact toolkit were used for this evaluation: Phase I: Identity-related Visitor motivational Categories instrument, Phase II: Conservation Affect instrument, Phase III: Concept Mapping. These ideas are explained below.

Identity-related motivations:

Pekarik et. al. (1999) found that visitors to a museum are likely to enter the museum

with a self-reinforcing "entry narrative." The entry narrative is based on the concept

that museum visitors are not "blank slates" when they arrive at a museum; they, in

fact, visit a museum with a narrative. The entry narrative has three components: 1) A

basic framework or fundamental way that individuals construct and contemplate the

world 2) information about the given content area topic-organized according to that

basic framework 3) personal experiences, emotions, and memories that verify and

support this understanding (Doering and Pekarik, 1996). The entry narrative directs

the visitor's learning and behaviors at the museum. In addition, Doering and Pekarik

state that visitors' perceptions of satisfaction will be directly related to the experiences

that resonate with their entering narrative. Falk (2006) postulates further that these

entry narratives or "situated" identities (Gee, 2001) are believed to be strongly related

to a visitor's underlying motivations. Identities used to be thought of as fixed personal

characteristics like ethnic background, socio-economic status, race, or gender, but

current research in identity and learning focuses on the dynamic, fluid and situated

nature of identity (Gee, 2000; Holland, 1998; Wertsch, 2002). From this larger

perspective, identities can be thought of as a confluence of internal and external

factors (Holland 1998) that get "activated" during particular activities, rather than

being static, fixed, and causative. Therefore a visitor to a zoo or aquarium doesn't just

bring a generic identity to their visit, they bring a zoo/aquarium "identity" to their

visit, and the visit helps them to enact and, therefore, build or reinforce that particular situated identity. This identity in turn drives/molds their motivations for that specific visit. The motivations expressed during a visit to a zoo or aquarium will directly impact how visitors conduct their visit and what meaning they make from the experience.

Conservation Attitude:

Museums, aquariums, national parks, science centers and zoos are important public learning institutions. There are a number of studies that support the conclusion that individual zoos and aquariums do have positive impacts in the form of learning outcomes for their visitors (Doering 1992, Swanagan 2000). However, these studies tend to be limited in scope and not easily generalized. Researchers have also documented forces that shape how people relate to the natural world (Price, Ashmore, and McGivern, 1994), but there is a deficit of information on the impact of a zoo or aquarium visit on conservation-related attitudes and knowledge. Because visits to zoos and aquariums may be some of the most memorable and important conservation-related learning experiences for people, there is a critical need to collect more data regarding the impact that zoos and aquariums have on visitors' conservation related behavior. The purpose of this part of the study was to determine if a visit to the Oregon Coast Aquarium makes a difference in the conservation related knowledge, attitudes, affect and behaviors of visitors.

Concept Maps/Personal Meaning Mapping:

Concept maps, a well-known tool used outside informal education settings are useful

for documenting both prior knowledge and experience and changes in knowledge.

While widely used in schools, these tools are used in very different ways in museums.

Concept maps are hierarchical, node-link diagrams that are intended to represent

meaningful relationships between concepts. These relationships are usually linked by

words to form propositions that together make up an approximation of the structural

complexity of a learner's understanding of a specific topic (Christensen, 2007). One

of the strengths of concept maps as assessment tools in informal education settings is

that they are more like learning activities than like exams, and they require

surprisingly little training of visitors to complete them (Christensen, 2007; Rollins,

2007). The resulting maps are basic documents of what participants think of as

important or salient at the moment of completing them.

Out of concern over the ecological validity of traditional assessment approaches based

on research on learning in classrooms, many museum researchers have called for new

tools based on research in museums themselves. Early studies using concept maps

eventually led to the development of a technique called personal meaning mapping

(PMM) (Falk, 2003). The PMM is related to the more general concept map, and has

been successfully used in free-choice learning settings (see Rebar, 2005 for a review).

However, PMM does require interviewing the visitors, which can be limiting for large

groups and is time consuming. Due to this fact, concept maps are often used instead.

Concept maps use the same theories and design as PMM, but exclude the interview

process. This study uses concept maps, instead of the AZA toolkit PMM process, to evaluate visitors' incoming expectations of a visit to the Oregon Coast Aquarium as well as the ideas and concepts visitors leave with. Gaining a more detailed understanding of a visitor's entry expectations and whether they are leaving with added knowledge will enable the Oregon Coast Aquarium to better understand the nature and extent of their impact.

Methodology

The data was collected in three different phases using three different instruments provided by the AZA 2007 toolkit.

Phase I, *Motivations Survey (Why are you here today?)*

Surveys from the AZA toolkit based on the work of Falk (2006) were used to determine visitor motivations and create a meaningful categorization of visitors based on their knowledge, interests, beliefs, attitudes, behaviors and motivations. The visitor selected five statements from a list of 20 that best explained why they chose to visit the Oregon Coast Aquarium on that particular day, and then they ranked the selected statements in importance to them using a seven-point Likert-type scale. In the summer of 2007, questionnaires were given to randomly selected visitors at several pre-determined locations at the Oregon Coast Aquarium. Every fifth adult that crossed a pre-determined imaginary line was approached to take the survey. Demographic data such as age, gender, and educational background was also collected. The sample size for this survey was 100 visitors.

Phase II, *Conservation Attitude Survey (How much do you agree with each statement?)*

An exit survey was done to determine visit effect on conservation attitudes. Visitors were asked to respond to a series of 13 statements and indicate, on a seven-point Likert-type scale, their agreement with the statements. Statements related to their attitudes toward 1) conservation, 2) their ability to effect change, and 3) the role the Oregon Coast Aquarium plays in promoting conservation. Following AZA toolkit instructions, the visitors were also asked to reflect on how they perceived they would have answered the 13 statements before their visit to the Oregon Coast Aquarium (as a retrospective-pre survey). In addition, demographic data such as age, gender and educational background was also collected. Sample size was 100 visitors. Survey sites were set up at the exit of the Aquarium.

Phase III, *Concepts Maps (Visit to the Oregon Coast Aquarium)*

Concept maps were used to measure two things. The first item measured was expectations. Expectations can be expressed as a set of associations visitors have regarding a visit to the Aquarium. The words used to described these associations were used to measure what visitors were thinking with regards to a visit to the Oregon Coast Aquarium as well as whether or not visitors' incoming expectations were met and or exceeded. The second item measured was visitors conceptual development. Within individual conceptual categories used by visitors, the breadth and depth of understanding was analyzed.

Before entering the aquarium, visitors were asked to write down as many images, thoughts, words, phrases and pictures that come to mind when given the prompt "Visit to the Oregon Coast Aquarium." They were then asked to draw lines between these concepts to show how they related and to write words between the concepts to explain how they linked to each other. They were shown a sample concept map to make sure they understood what they were being asked to do. Upon exiting, the same visitors were asked to repeat the same task as before on a new sheet of paper. Demographic data such as age, gender, and educational background was also collected. The sample size collected was 40. The data collection site was set up at the entrance and exit to the Oregon Coast Aquarium. A small "thank you" gift was given to participants who completed both parts of the survey.

The data for this evaluation plan was collected July 15-September 1st 2007. This time period was chosen primarily because it is the peak visitor season for the Oregon Coast Aquarium. Data collection sites were tested in several locations inside and outside the Aquarium and the most productive sites were then used to collect data. For Phase I, Visitor Motivation Survey, data collection was either located inside the "Passages of the Deep" exhibition directly before the Orford Reef exhibit, or outside the exit of "Passages of the Deep." Both places had benches that enabled visitors to sit down and also be out of the area of main foot traffic. For Phase II, Conservation Affect Survey, data was collected outside on the gravel pathway between the snowy plover exhibit and the gift shop. Areas closer to the exit were attempted, but with failed results. This

may have been due to several reasons, the first being that once visitors are ready to leave the Aquarium and are walking towards the exit, they were found to be less likely to stop and participate. A second potential reason is there were not a lot of options of being close enough to the exit without being in a high foot traffic area. As suggested by the toolkit, a table and chairs were set up to provide a place for visitors to sit and participate away from main foot traffic. For Phase III, Concept Maps, data collection was located outside to the right of the Aquarium entrance. A table and chairs were set up to provide a place for visitors to sit and participate.

<u>Participants</u>

Included with all three types of visitor surveys (visitor motivations, conservation

attitudes, and concept maps) were questions about visitor demographics such as age,

gender and educational background. The total sample size for the demographic data

was 324. Since participants were randomly selected to participate, they should

represent a generalizable subset of summer visitors. The results are as follows:

Demographic region:

Visitors to the Oregon Coast Aquarium come from a wide variety of places although a

majority of them come from the western United States. Forty-four percent of visitors

are from the Pacific Northwest (Alaska, British Columbia, Oregon and Washington)

and another seventeen percent of visitors are from western states such as California,

Colorado, Nevada and Utah.

Figure 1: Results of Visitor Demographic regions.
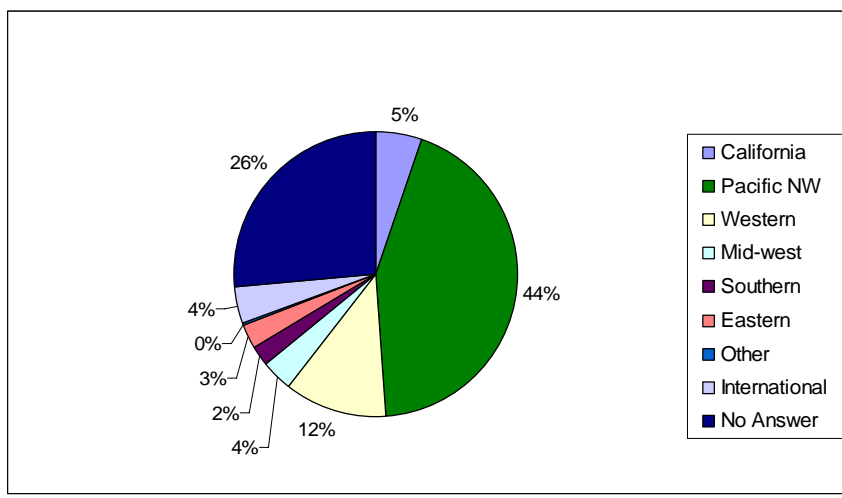
Age Range:

Each adult age group is fairly evenly represented at the Oregon Coast Aquarium.

Fifteen percent of visitors to the Oregon Coast Aquarium were between 22 to 30 years

old and seventeen percent were among ages 31 to 40, 41 to 50, and 51 to 60.

Figure 2: Age Range of Visitors at the Oregon Coast Aquarium.
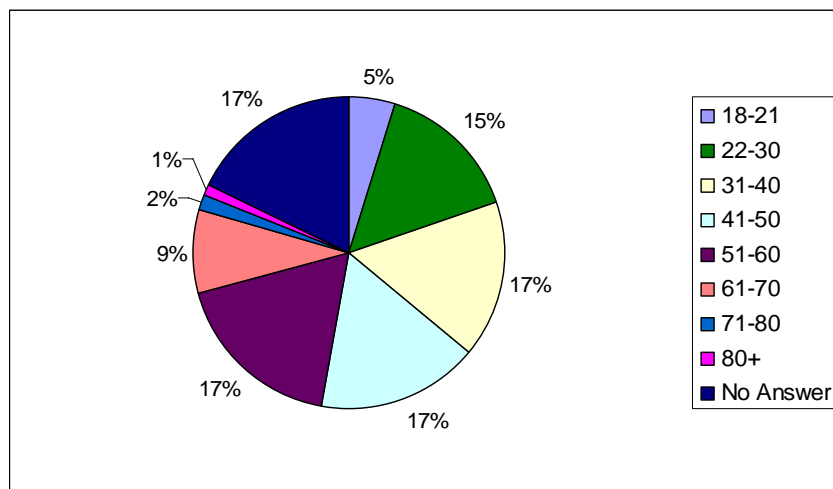
Educational Background:

Overall visitors to Oregon Coast Aquarium are well educated. Forty-four percent of

respondents report having a college degree or higher, with another seventeen percent

having had some college education (Figure 3). The trend of highly educated visitors

can also been seen in winter/spring months (Figure 4). Sixty-four percent of visitors

that participated in the Hodak (2008) study had a college degree of higher. Data from

Hatfield Marine Science Center (HMSC) in 2006 (Figure 5) and data from Hodak

(2008) in Figure 4, also show a similar trend.

Figure 3: Educational Background Data results from the Oregon Coast Aquarium for

summer 2007.
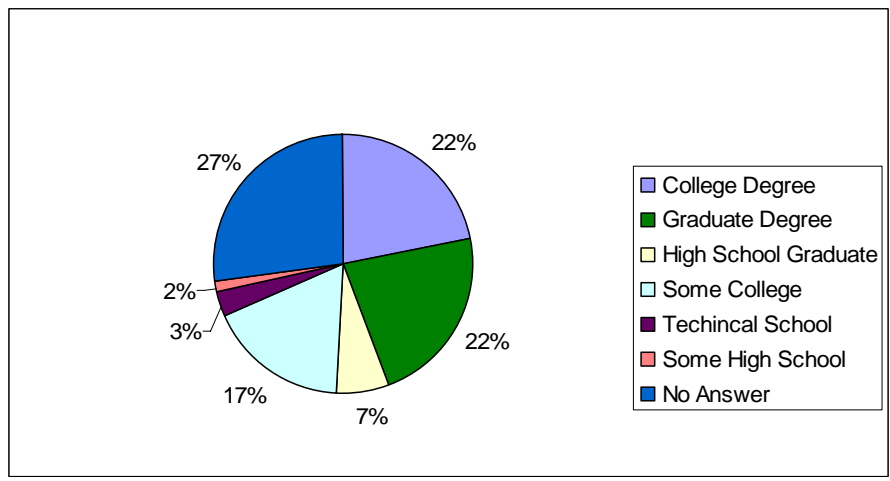
Figure 4: Oregon Coast Aquarium educational background data results from (Hodak,

2008). Collected winter/spring 2008.
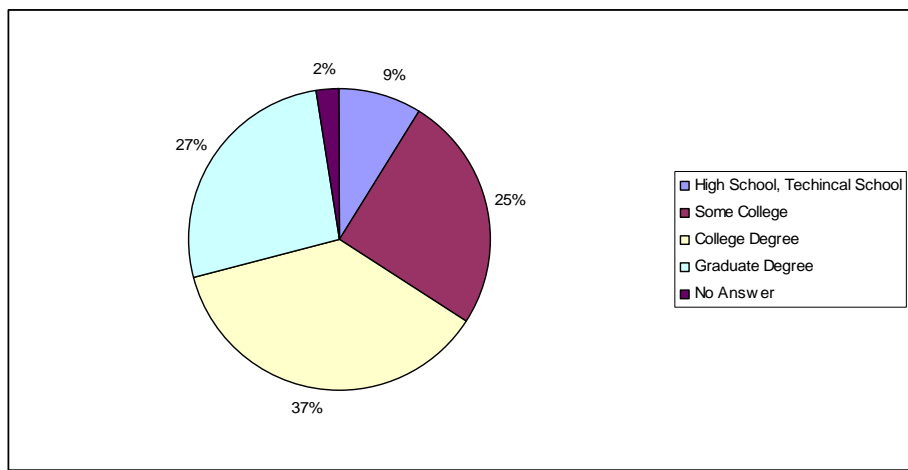
Figure 5: Demographic data from HMSC for summer 2006, people who filled out surveys on iPods use.

Educational Attainment of Adult Participants

4%

7%

13%

38%

38%

- High School
- Associates or Technical Degree
- Some College
- College
- Graduate School
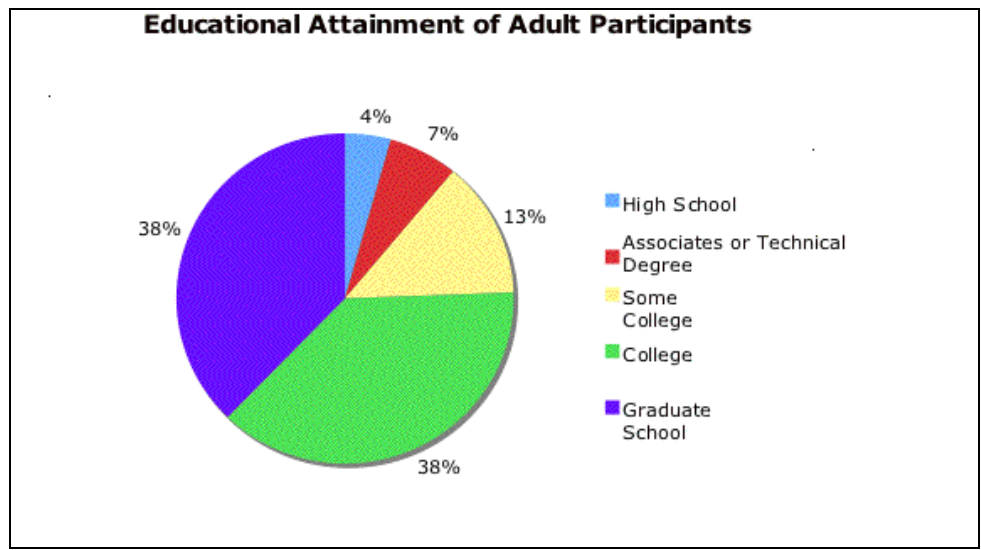
Visitor Frequency:

Visitors were asked if they had visited the Oregon Coast Aquarium prior to their current visit. Thirty-seven percent of the survey respondents indicated that they had been to the Oregon Coast Aquarium once or more (before their current visit).

Figure 6: Frequency of Visitors to the Oregon Coast Aquarium**.**
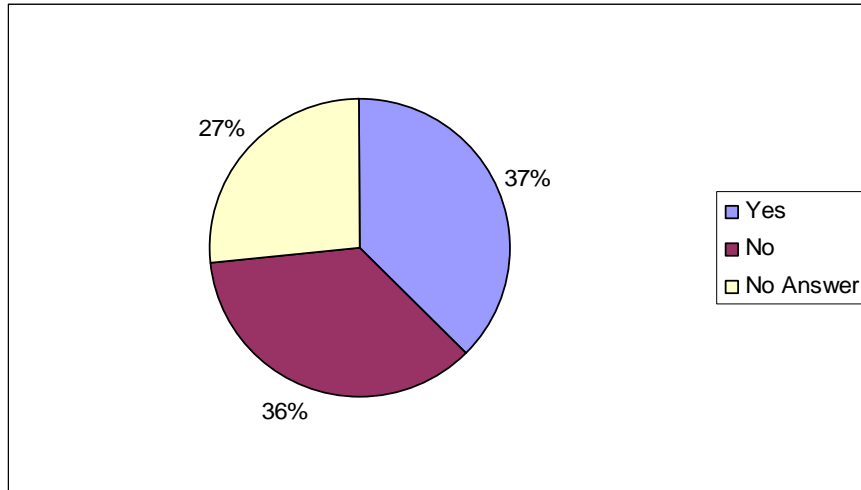
Gender:

Fifty-two percent of survey participants were female whereas thirty-four percent of survey participants were male. One visitor reported being transgender.

Figure 7: Gender Distribution of Visitors at the Oregon Coast Aquarium.
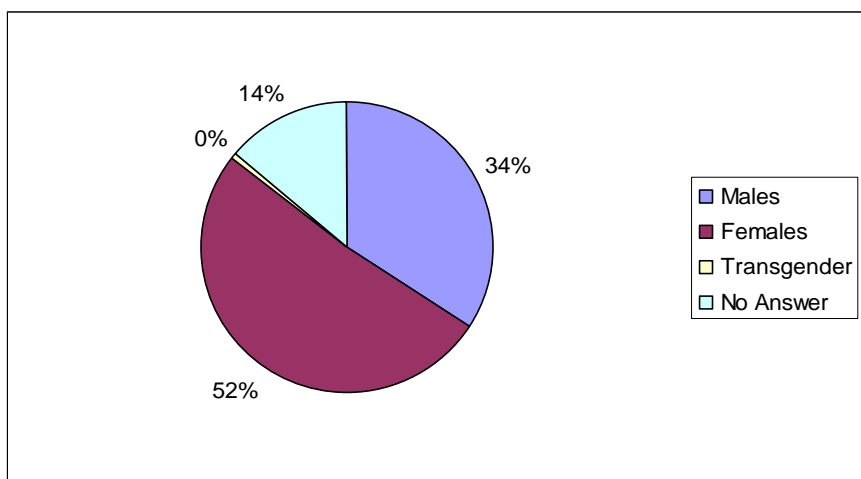
Visitor Group Dynamics:

Forty-one percent of visitors to the Oregon Coast Aquarium come as part of an adult

peer group. Adult peer groups are considered any group of 2 or more that are18 and

older and that visited the Aquarium without children. Meanwhile thirty-six percent of

our visitors surveyed were in multigenerational groups (groups with children 18 and

under).

Figure 8: Visitor Group Dynamics of Oregon Coast Aquarium
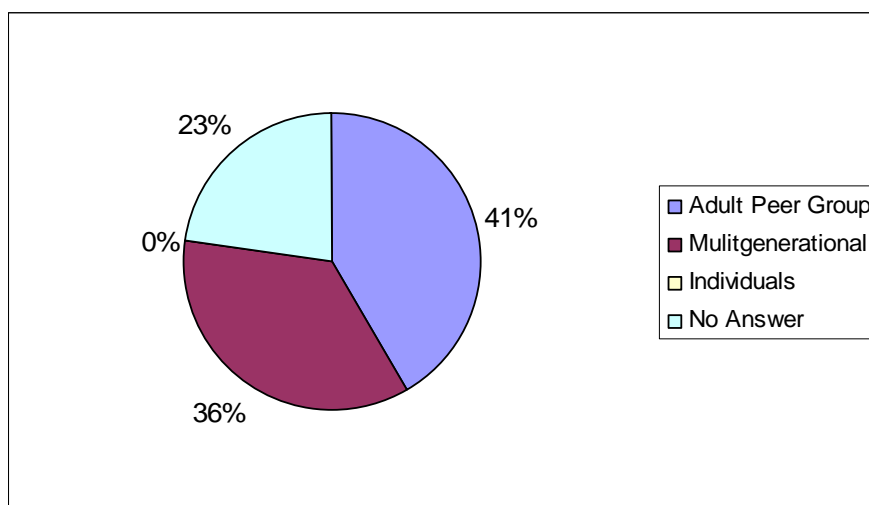
Results and Discussion

Phase I, Visitor Motivations:

Doering and Pekarik (1996) believe that visitors to museums arrive with an entry

narrative. According to them, these narratives are self –reinforcing, directing both

learning and behavior. Falk (2006), took this idea a step further and postulated that although people have diverse reasons for choosing to visit a museum, their reasons tend to cluster around a small number of motivational categories. Moreover, Falk (2006) states that these categories appear to be related to the visitors' desires to use the museum to fulfill identity-related needs.

Falk (2006) clusters identity-related motivations into five distinct categories:

- *Explorers* are curiosity driven with generic interest in the content of the museum. They expect to find something that will grab their attention and fuel their learning.

- *Facilitators* are socially motivated. Their visit is focused primarily on enabling the experience and learning of others in their accompanying social group.

- *Professional Hobbyists* feel a close tie between the museum content and their professional or hobbyist passions. Their visits are typically motivated by a desire to satisfy a specific content related objective.

- *Experience Seekers* perceive the museum as an important destination, so their satisfaction derives mainly from having "been there, done that."

- *Spiritual Pilgrims* are primarily seeking to have a contemplative, spiritual and/or restorative experience. They see the museum as a refuge from the work-day world.

Based on the individual survey results, a visitor to the Oregon Coast Aquarium could

fall into one of three categories depending on whether they fell into one, two or more

than two of the five motivation categories:

- **A single dominant motivation**. If an individual indicated a strong motivation (a

  score of 14 or higher on the survey analysis) within one motivational category, he

  or she was considered to express a single dominant motivation from the list of 5

  above.

- **A non-dominant motivation.** An individual is considered to express a non-

  dominant motivation if none of the five motivational categories scored above a 14.

  In many cases this means that a visitor may have more than two competing or

  equally valid motivations for being there on that day.

- **A dual-dominant motivation.** An individual is considered to express a dual

  dominant motivation when he or she indicates strong motivations (a score of 14 or

  more) in two motivational categories simultaneously.

Data Analysis:

Participants were asked to choose 5 out of 20 statements that best described

their reason for being at the aquarium on that day. They were then asked to rank each

of those from 1 to 7 based on how strongly they felt it represented their motivation for

that day. Although visitors are asked to choose 5 statements, each motivation subscale

only has 4 statements associated with it. Scores were assigned based on the number

chosen on the Likert-type scale for the 5 statements selected. Since there are 4

statements associated with each motivation, an individual could score a maximum of

28 points within any one of the 5 motivations categories. For example, an individual who selected all four statements from the same identity-related motivation category and rated each a 7 would receive 28 points within that category and no more than 7 points in another category represented by the 5th statement selected. Thus, a score between 14 and 28 on any given motivation scale was interpreted as indicating a dominant motivation. If participants had two motivations scoring between 14-28, this was interpreted as a dual dominant motivation. A score below 14 for all/any of the five motivations was interpreted as non-dominant.

Table 1: The Percent of Respondents falling into the 5 possible motivations. Using point scale 14-28 for defining dominant motivations following Falk, et. al. (2008)

OCA Summer 2007 n= 101	
Motivation	**% of Respondents**
Experience Seeker	0.0
Professional Hobbyist	8.9
Spiritual Pilgrim	5.0
Facilitator	11.9
Explorer	7.9
Dual-dominant	8.9
Non-dominant	57.4

Discussion of Results:

Summer visitors to the Oregon Coast Aquarium come with specific identity related motivations. Forty-three percent of visitors indicated a clear dominant motivation. Nine percent of visitors were found to have a dual dominant motivation and 33.7% indicated a single dominant identity related motivation for their aquarium visit. Fifty-seven percent indicated a non-dominant motivation.

Professional Hobbyist:

Of the one hundred and one visitors sampled in the summer of 2007, nine percent indicated a clear dominant "professional hobbyist" motivation. Forty-four percent of visitors that indicated a Professional Hobbyist motivation were female and thirty-three percent of them were male. Forty-four percent of professional hobbyists indicated having a college degree or higher. Fifty-six percent of professional hobbyists visited the Oregon Coast Aquarium with an Adult peer group whereas twenty-two percent visited in a multigenerational group.

Facilitators:

Of the one hundred and one visitors sampled in the summer of 2007, twelve percent of visitors indicated a clear dominant "facilitator" motivation. Sixty-seven percent of visitors that indicated a facilitator motivation were female and thirty-three percent of them were male. Fifty-eight percent of facilitators indicated having a college degree or higher. Seventeen percent of facilitators visited the Oregon Coast Aquarium with an adult peer group were as eighty-three percent visited in a multigenerational group.

Non-dominant motivations:

Some might argue how good is a survey when it doesn't discriminate among roughly

fifty percent of visitors who fall into a non-dominant category. What does that tell the

institutions using this survey? A non-dominant visitor is one that expresses many or

more than two motivations. A non-dominant motivation could be considered visitors

who have multiple motivations for visiting, and those motivations almost dilute one

another. They, therefore, will not exhibit a single clear dominant motivation.

Table 2: Percent of Visitors entering with a single identity related motivation.

Comparison across three sites (Falk et al, 2008).

Motivation	Oregon Coast Aquarium (n =101)	New York Aquarium (n = 238)	National Aquarium (n = 421)
Explorers	7.9	22.3	14.0
Facilitators	11.9	15.5	6.7
Professional Hobbyist	8.9	15.1	13.2
Experience Seekers	0.0	8.4	5.9
Spiritual Pilgrims	5.0	5.5	5.3
Total	33.7	66.8	45.1

Comparing the data collected at the Oregon Coast Aquarium to data collected by Falk

et.al. (2007) at the National Aquarium and the New York Aquarium (Table 2), one can

see some differences in the relative amounts and types of motivations represented.

From table 2, it is evident that facilitators, professional hobbyists and explorers

dominate the motivation categories for the three aquariums. The Explorer motivation

was found to be the most dominant motivation category expressed by visitors at both

the New York and National Aquarium, but not the Oregon Coast Aquarium's summer

audience. The differences could be due to different visitorships at the three

organizations. Due to the location of the Oregon Coast Aquarium, it can be considered

unique from other AZA institutions. It is a medium sized aquarium; however, it is in a

small town. It draws a large percent of its visitors from a "tourist" base. On the other

hand, the National and New York Aquariums are located in large populated areas, and

may attract fewer tourists and more locals. Because of the location and visitor

demographics of the Oregon Coast Aquarium, it is very likely that the tourist or "just

passing through" mentality would create the trends found by the motivations survey.

Another interesting trend between the three aquariums is that the Oregon Coast

Aquarium did not exhibit any Experience Seeker motivations. This could be due to the

fact that there weren't any Experience Seekers at OCA or because the instrument

didn't/couldn't capture them. That being said, the next question would be, where are

the Experience Seekers going, if not to the Oregon Coast Aquarium? Are the

Experience Seekers going on Eco tours? To lighthouses? Hiking or camping? To

answer this question, an additional survey or questions could be added in conjunction

with the motivation's survey to determine what other activities Oregon Coast visitors

are partaking in while in Newport, Oregon.

Phase II, Conservation Attitude Survey:

The conservation affect survey was created to measure visitor's attitudes towards 1)

conservation; 2) their ability to effect change; and 3) perceptions of the Oregon Coast

Aquariums role in dealing with conservation issues.

Data Analysis:

Table 3: AZA Toolkit Data Analysis Software Output from Conservation Affect

Survey.

#	Sub Scales	Pre				Post				Significance
		Mean	Median	Mode	Std Dev	Mean	Median	Mode	Std Dev	
1	Individual responsibility	5.258	6.000	7.000	1.763	5.555	6.000	7.000	1.717	1.57429E-07
2	Attitude toward zoos/aquariums	5.613	6.000	7.000	1.416	6.453	7.000	7.000	0.900	1.06391E-27
3	Human protection of nature	6.397	7.000	7.000	1.174	6.700	7.000	7.000	0.905	4.93592E-10

The 13 statements on the conservation affect survey were further broken down and put

into one of three overarching categories: individual responsibility, attitude toward

zoos/aquariums, and human protection of nature. The data analysis output (shown in

Table 3) show several different outputs: 1) The mean, which is the arithmetic average of a set of values, or distribution, 2) the median, which is is the middle of a distribution: half the scores are above the median and half are below the median, 3) The mode, which is the most frequently occurring score in a distribution and is used as a measure of central tendency and 4) the standard deviation, which is a measure of how spread out your data are. Unfortunately, the toolkit directions do not specify how to determine significance from this output. Moreover, the toolkit does not explain what type of statistical test was used to create this output. Therefore, the only analysis that can be made is a descriptive one. Based on the means from table 3, all three overarching categories were found to have changed in a positive direction from pre to post visit.

Discussion of Results:

The conservation affect survey results suggest that the Oregon Coast Aquarium visitor leaves the aquarium thinking differently about their role in environmental problems. The visitors' attitudes toward conservation issues significantly increase after a visit. These results are similar to several published studies with regards to understanding visitors' conservation knowledge, attitudes and behaviors. Adelman, Falk, and James (2000), found that visitors had a strong positive attitude toward conservation issues as well as the roles and responsibilities people have locally and globally. In another study by Adelman et al. (2001), visitors to Disney's Animal Kingdom were generally knowledgeable about conservation issues. Moreover, visitors to the site easily identified wildlife conservation as a term and a concept, their conceptual

understanding was consistent with the meaning of conservation for zoological institutions.

Though the data does show positive changes in OCA visitors attitudes towards conservation, this data must be interpreted cautiously. This data is immediate post visit responses about someone's perceptions of their pre and post visit attitudes. Visitors are asked at the time of exiting the OCA to rank both how they felt when leaving and how they felt when they were coming in. It is not clear whether the changes indicated are due to the overall positive feelings upon leaving or whether those feelings will persist.

Phase III, Concept Maps

From a constructivist point of view, meaningful learning requires the following three conditions: the material is conceptually clear and relatable to a learner's prior knowledge; that the learner possesses relevant prior knowledge, and the learner chooses to learn meaningfully (Novak and Canas, 2006; Rollins 2007). Concept maps are tools that enable visitors to express concepts and what they believe about the relationships between those concepts while reflecting on their own thinking and learning. That being said, concept maps can prove to be an effective way to measure and analyze the knowledge structure and cognitive understanding of a person, as well as the link between prior knowledge and how new information adds to and incorporates into that prior knowledge (Novak, 2006).

In this study, concept maps were used to gauge a visitor's overall expectations, thoughts, and feelings about a visit to the Oregon Coast Aquarium. Though PMM was used in the AZA toolkit, the decision was made here to use concept maps instead. This decision was based on the preference to take as little time from participants' visit as possible. Additionally, concept maps require less effort on the part of the data collector and are, therefore, potentially more likely to be used by museum staff in assessments and evaluations than any tool that requires extensive time or interviewing. Lastly, concept maps have proven to be useful instruments for evaluating programming and assessing learning at the Oregon Coast Aquarium (Smith, 2007). Before they entered the Aquarium, randomly selected visitors were asked to participate and given a blank piece of paper with the prompt "visit to the Oregon Coast Aquarium" along with instructions. The same visitors were asked to complete a second map at the end of their visit. To analyze the data, evaluators read the concept maps, and individual words on them were assigned into broad conceptual categories. A list of the conceptual categories can be seen in Table 2. The data analysis was done by two separate reviewers to ensure inter-rater reliability. Conceptual categories and qualitative data were entered into a spreadsheet for each pre-map and each post-map. Differences in overall associations and in visitors' conceptual understanding within individual categories between pre and post-maps were evaluated. Chi squared analysis with a Yates correction for continuity was preformed to test for significant differences of breadth and depth from pre-map to post-map.

Data Analysis:

Table 4: Concept/Code List Used to Analyze Oregon Coast Aquarium Visitor Concept

Maps.

1. Classification (sea life, wildlife)
2. Comments on exhibit or Aquarium (Aviary, the crab exhibit was wonderful)
3. Comments on staff, volunteers, divers or other visitors (crowed, very friendly staff)
4. Actions that take place in aquarium (Walking, touching)
5. Fish (rock fish, salmon)
6. Inverts (sea stars, sea cucumbers)
7. Marine Mammals (sea otters, whales)
8. Sharks (sharks, leopard sharks)
9. Birds (puffins, plovers)
10. Aquatic plants (sea weed, kelp)
11. Crustaceans (crabs, shrimp)
12. Comments, thoughts, questions (Bathrooms are clean, what are the orange jelly's called?)
13. Things/Facts learned (over 60 species of rockfish)
14. Tourism (gift shop, money, fishing, vacation)

Associations:

Pre maps were used to gauge visitors' expectation of a visit. Expectations were

measured by analyzing words used by visitors' to describe associations they had with

the prompt "visit to the Oregon Coast Aquarium". These associations assisted in

understanding what visitors were thinking about in terms of their visit to the OCA

when they arrived as well as what they were expecting to see during their visit (table 5

and 6). These associations were then compared to post map data to see if there were

changes in visitors overall associations with a visit as well as whether or not incoming

visit expectations were met and or exceeded.

In addition to analyzing for expectations, the maps elicited some prior knowledge about particular conceptual categories that are potentially of interest to the aquarium in understanding what knowledge visitors come in with and how a visit might be changing that knowledge. Changes in conceptual categories were measured by looking at changes in breadth and depth within categories between pre and post maps.

Breadth:

Breadth can be defined a measure of a visitor's understanding or the range of a visitors' conceptual understanding (Falk, 1998). Like the methodologies used in other recent studies carried out at OCA, Hatfield Marine Science Center, and Marine Discovery Tours (Christensen, 2007; Smith, 2007; Rollins, 2008), words used on maps were assigned into broad conceptual categories. Breadth was analyzed in two ways. The first analysis of breadth looked at the total number of categories used by visitors on pre and post maps. The second part of analysis involved investigating the breadth within individual categories. Individual categories were analyzed for significant increases or decreases of occurrence between pre and post maps.

Depth:

Depth can be defined as a measure of how detailed and complex, within a category, descriptions are (Falk, 1998). The depth was measured by comparing, within individual categories, the change in the number of mentions per category pre vs. post map. The increased use of categories indicates the ability to better sort information,

typical of what is looked for when evaluating maps for hierarchical change (Smith, 2007).

Tables 7 and 8 present the data for both breadth and depth. Each table contains each concept category that was analyzed. The tables also show the percent of visitors that use each concept category as well as the p-values which show whether the breadth or depth significantly increased or decreased pre and post visit.

Table 5: Visitors' incoming associations of a visit to the Oregon Coast Aquarium.

Pre (n = 42)		
Category:	# of maps that mention category	% of Visitors
Category:	# of maps	%
Fish	31	73.80
Exhibits	28	66.67
Marine Mammals	28	66.67
Sharks	26	61.90
Inverts	23	54.76
thoughts/comments	20	47.61
Tourism	17	40.48
Educational	16	38.10
People	15	35.71
Actions	15	35.71
Classification	12	28.57
Birds	8	19.05
Crustaceans	6	14.28

From table 5, the top five subjects visitors were associating with a visit to the OCA were found to be Fish, Exhibits, Marine Mammals, Sharks, and Invertebrates. The least mentioned categories were found to be birds and crustaceans. Based on visitors'

entering associations, I was also interested to what extent these associations had

changed after a visit. This was measured by looking at the frequency of mentions and

comparing them pre to post map (table 6).

Table 6: Frequency of mentions pre to post map.

Pre (n = 42)			Post (n = 37)		
Category:	**# of maps that mention category**	**% of Visitors**	**Category:**	**# of Maps that mention category**	**% of visitors**
Fish	31	73.80	Exhibits	28	75.68
Exhibits	28	66.67	Inverts	26	70.27
Marine Mammals	28	66.67	Fish	25	67.57
Sharks	26	61.90	Marine Mammals	25	67.57
Inverts	23	54.76	Thoughts/comments	21	56.75
thoughts/comments	20	47.61	Crustaceans	19	51.35
Tourism	17	40.48	People	14	37.83
Educational	16	38.10	Sharks	14	37.83
People	15	35.71	Birds	13	35.14
Actions	15	35.71	Actions	12	32.43
Classification	12	28.57	Tourism	12	32.43
Birds	8	19.05	Facts	8	21.16
Crustaceans	6	14.28	Educational	7	18.92

As you can see from table 6, some visitors associations were changed. For example,

only fourteen percent of incoming visitors had associated crustaceans with a visit to

the OCA; however, upon leaving this increased to fifty-one percent, more than likely

due to the "CLAWS" exhibit. From this data, you are also able to see if visitors'

incoming expectations were met or exceeded. For example, sixty-six percent of

visitors were expecting to see marine mammals during their visit to the Aquarium.

Upon exiting, sixty-seven percent of visitors still maintained that association. These

visitors came to see marine mammals and their expectations were satiated. An

interesting observation was that thirty-eight percent of visitors associated a visit to the

OCA as educational on their pre-maps, however only eighteen percent report that after

a visit. This may be due to the fact that education is not an explicit theme of most of

the exhibits.

Since the pre and post test data I gathered on associations also included more

or less depth of information about particular categories (like marine mammals for

instance), I has a chance to look at visitors' incoming and exiting understanding of

each conceptual category. This was analyzed by looking at the visitors' breadth and

depth within each individual conceptual category (Table 7 and 8). The data is

presented in tabular form in the next several tables and discussed in the following

section.

Table 7: Pre and post visit breadth, within each category on concept maps. (Chi-

squared with Yates continuity corrections.)

Pre (n = 42)			Post (n = 37)			
Category:	# of maps that mention category	% of Visitors	Category:	# of Maps that mention category	% of visitors	p-value
Classification	12	28.57	Classification	4	10.81	$p = 0.0141$
Exhibits	28	66.67	Exhibits	28	75.68	No change
Educational	16	38.1	Educational	7	18.92	$p = 0.0176$
People	15	35.71	People	14	37.83	$p = 0.6985$
Actions	15	35.71	Actions	12	32.43	$p = 0.3664$
Fish	31	73.8	Fish	25	67.57	$p = 0.2435$
Marine Mammals	28	66.67	Marine Mammals	25	67.57	$p = 0.5081$
Sharks	26	61.9	Sharks	14	37.83	$p = 0.0142$
Birds	8	19.05	Birds	13	35.14	$p = 0.1117$
Inverts	23	54.76	Inverts	26	70.27	$p = 0.6027$
AQ plants	3	7.14	AQ plants	0	0	$p = 0.0434$
Crustaceans	6	14.28	Crustaceans	19	51.35	$p < 0.00$
thoughts/comments	20	47.61	Thoughts/comments	21	56.75	$p = 0.911$
Facts	2	4.76	Facts	8	21.16	$p = 0.0001$

Tourism	17	40.48	Tourism	12	32.43	p = 0.1821

Table 8: Pre and post visit depth, within each, category on concept maps. (Chi-squared with Yates continuity corrections.)

Pre (n = 42)		Post (n = 37)			
Category:	**# of mentions per category**	**Category:**	**# of mentions per category**	**p-value**	**Change**
Classification	14	Classification	5	p = 0.0112	Decrease
Exhibits	58	Exhibits	79	p = 0.0071	Increase
Educational	25	Educational	7	p = 0.0002	Decrease
People	22	People	23	p = 0.9165	Increase
Actions	19	Actions	17	p = 0.5668	Decrease
Fish	51	Fish	57	p = 0.4413	Increase
Marine Mammals	41	Marine Mammals	38	p = 0.5851	Decrease
Sharks	33	Sharks	21	p = 0.0296	Decrease
Birds	14	Birds	28	p = 0.0003	Increase
Inverts	48	Inverts	65	p = 0.0173	Increase
AQ plants	4	AQ plants	0	p = 0.0245	Decrease
Crustaceans	9	Crustaceans	36	p < 0.00	Increase
thoughts/comments	41	Thoughts/comments	68	p < 0.00	Increase
Facts	3	Facts	12	p < 0.00	Increase
Tourism	34	Tourism	24	p = 0.0719	Decrease

Along with accounting for breadth and depth, other qualitative aspects were also measured. Qualitative measures include use of affective language, changes in specificity, changes in use of scientific language, the presence of conservation messages, use of drawings, and overall structure of the maps.

- Affect is described as an expressing of feelings. Examples of affect found on visitors' concept maps included: "wow", "exciting", "fun". Maps were coded

for presence or absence of affect, and affect was measured by either an increase or decrease on pre to post-maps.

- Specificity is the measure of the depth of the explanation. This measurement looks at each proposition as either basic (addressing a factual "what" question) or higher-order (describing function or purpose, i.e., "how" or "why" questions). For example, on the pre map a visitor might write "salmon;" on the post map "salmon sometimes try several streams." Each post map was holistically coded for the specificity in relation to its pre map. If the post map was deemed more specific, it was coded as changing positively, if there was no change, that was coded, and if there was a loss of specificity, it received a negative code. Specificity was measured by either an increase or decrease between pre and post maps.

- Scientific Language is defined as words that are learned in science classes, science programs, or used by the scientific community in general and may include exact numbers and measurements (Christensen 2007). Several studies/theories have shown that a change from the use of everyday to scientific language may serve as indicators of mastery (Gee, 2001; Rowe, 2002; Stoddart et al, 2000). For example, "bringing ecosystems to life," or "Salmonid" are scientific versus everyday formulations. All maps were coded for the presence of scientific language, and post maps received a holistic score of plus, minus or no change in relation to each pre map. Scientific language was measured by either a presence or absence on pre and post-maps.

- Drawings were measured for either presence or absence on pre and post-maps.

- Not all concept maps are equal, and theory suggests that the more expert a person is, the more complex the structuring of concept maps. For this study, structure is defined as levels of hierarchical, node-linked diagrams that are intended to represent meaningful relationship and concepts. The concepts maps were placed into one of four possible structure categories based on Vygotsky's descriptions of the phases of conceptual development (1986).

    1) Heap: heap maps generally have no pattern, no hierarchy and things written down are not related.

    2) Chain: Chain maps may exhibit hierarchical levels using node-linkages, but the linkages are not related to each other.

    3) Complex: Complex maps may not have node-linkages or levels, but "like" things are grouped together or they exhibit loosely related levels.

    4) Concepts: Concept maps exhibit fully articulated concepts, sentences, levels and meaningful hierarchy.

Table 9: The number of pre and post maps that exhibit of one the four possible structure categories

Map Structure	Number of Pre-maps	Number of Post-maps
Heap	34	29
Chain	8	4
Complex	0	4
Concepts	0	0

Results and Discussion:

There were 15 main conceptual categories present on the maps. Out of these, the most common categories seen on pre-maps were fish (73.8%), comments on exhibits (66.7%), marine mammals (66.7%), and sharks (61.9%). The most common conceptual categories seen on post maps were comments on exhibits (75.6%), invertebrates (70.2%), fish (67.5%), and marine mammals (67.5%). Based on these results, there seems to be a shift in associations visitors have with a visit to the Aquarium pre and post visit. Two categories which changed pre to post visit were sharks and crustaceans. This could be due to the fact that most visitors who filled out concept maps had been to the Aquarium before and had enjoyed the shark exhibit. However, many visitors did not complete the demographic information page of the survey, which asked if they had visited the Oregon Coast Aquarium before, so it is hard to tell. The data from the concept maps suggest that visitors are arriving at the aquarium and associating their visit with sharks and the Passages of the Deep exhibit. However, when visitors are leaving, their associations with a visit to the OCA have changed to mentions crustaceans instead of sharks. This could be due to the impact of the OCA temporary exhibit "CLAWS".

Breadth (The range of conceptual understanding):

One fewer category was used between pre and post maps which could indicate a small tightening of focus (as found in both Christensen, 2007 and Rollins, 2008). The second part of analysis involved investigating the breadth within individual categories.

For each category, the change in the number of people who mentioned each category between pre and post maps was compared. The mentions of classification, education, sharks, and aquatic plants all significantly decreased ($p<.05$) from pre to post map. The mentions of, crustaceans and facts learned all significantly increased ($p <.05$) from pre to post map. These increases and decreases could suggest the broadening and narrowing of certain concepts from pre to post map. The analysis of breadth indicates that the "CLAWS" exhibit did have an impact on visitors. Visitors left the aquarium with added knowledge and associations of crustaceans with a visit. It was interesting to see that the mentions of education such as "learning new things" or associating the aquarium with learning decreased. However, the category of facts increased, which would lead me to believe that visitors expected to be learning when they came into the aquarium and validated that expectation when they left by stating facts that they learned during their visit.

Depth (How detailed and complex, within a category, visitors descriptions were):
The depth within the concepts of classification, education, sharks, aquatic plants and tourism decreased significantly ($p <.05$) from pre map to post map. Exhibits, birds, invertebrates, crustaceans, comments/thoughts, and facts learned all increased significantly ($p < 0.5$) from pre map to post map. Like in the breath measurement, the shift of themes/associations from sharks to crustaceans can be seen in the depth measurements as well.

The results show that the concept map can be an effective tool for analyzing visitors'

incoming associations with their visit as well as leaving experiences. Visitors entered

the aquarium with certain expectations and predisposed knowledge and, overall, left

with different ones. For example, before entering the Oregon Coast Aquarium, there

were 33 mentions of sharks, 9 mentions of crustaceans and 14 mentions of birds.

When the visitors exited the aquarium there were 21 mentions of sharks, 36 mentions

of crustaceans and 28 mentions of birds. The total mentions of sharks decreased after

a visit, but the total number of mentions of birds and crustaceans increased. This can

be used as an example of visitor theme shifts, but can also be viewed as a gauge of

measuring the effects of a specific exhibit. The concepts maps suggest that the

"CLAWS" exhibit has the potential to leave a lasting impression on visitors. Hardly

any entering visitor mentioned crustaceans, but after a visit many visitors left

mentioning crustaceans and with added knowledge of crustaceans ($p < .05$).

The concept map can also be considered an effective tool for analyzing the thoughts,

feelings and preconceptions of visitors to the Oregon coast Aquarium. Most maps

were done in a group setting which allowed adult peer groups and multigenerational

groups to work together and discuss their expectations before and after a visit. In this

way, they become important tools for thinking about and reflecting on learning, two

facets of learning that are important elements in the learning cycle and often not

supported in free-choice learning (Rowe, 1998).

Other qualitative trends were also noted. For example, specificity increased from pre-maps to post-maps. Visitors were able to recall and discuss exhibits and experiences from their visit more specifically. For example, on one pre concept map (See Appendix) there was no mention of crustaceans, and the other concepts mentioned were fairly broad: "Fish", "Mammals" and "gift shop". However on the post-map the same participants listed several names of crab species: "Japanese crabs" and "Horse-shoe crabs overhead". Affect or use of words that express feelings remained constant from pre to post-maps. The use of scientific language was low on both pre-maps and post-maps. Most visitors used little scientific language on their maps.

The overall complexity of the maps also reveals cognitive understanding (Rollins, 2008). As discussed by Ruiz Primo et al (1997), as the mastery of a domain increases, the structure of a concept map will become more "expert." Based on this, concept maps were placed into categories of either heap, chain, complex or concept. The structures of the maps were measured based on the whether they were found to become more complex from pre-maps to post-maps. The analysis revealed that there was an increase in overall structure from pre-maps to post-maps which could indicate that visitors increased their knowledge of hierarchical content (Table 9). Due to the increase in structure from pre to post maps it could also indicate that visitors were more able or willing to express their knowledge of concepts and the relationships between those concepts at the end of their visit.

The maps were also used to gauge if any conservation messages were either brought in or taken away from a visit to the Oregon Coast Aquarium and unfortunately, using the concept maps, conservation was not reported either pre or post visit. This could be due to the fact that when visitors thought of a visit to the Oregon Coast Aquarium, they did not associate a visit with conservation or learning about conservation. The lack of conservation mentions could also be due to the prompt not being specific enough to capture any conservation remarks, or finally it could be due to a minimal amount of conservation messages throughout the Aquarium.

Conclusions & Recommendations

The evaluation plan was created to provide the Oregon Coast Aquarium with baseline data on visitor motivations, visitors' pre-existing and gained conservation-related attitudes, and overall perceptions of a visit to the Oregon Coast Aquarium. The following tools from the AZA Impact toolkit were used for this study: Phase I: Identity-related Visitor Motivational Categories instrument, Phase II: Conservation Affect instrument, Phase III: Concept Mapping.

AZA toolkit Comments and Suggestions:

Phase I: *Motivations Survey.*

The motivations survey is a working document and like most surveys will always need to be re-evaluated and reworked. The motivations tool is useful as a beginning step to meaningfully categorizing visitors to free-choice learning institutions. I say beginning, because I think that the tool only touches the surface of visitor motivation. Past research on motivations has suggested that people come in with multiple motivations, not necessarily just one. This is seen by the results of the survey showing more than 50% of visitors as "non-dominant". Past experience, culture, and educational all shape a person's motivations and in turn could cause 50% of the visitors to have more than 2 motivations for visiting. The survey is unable to break down the motivations further than that. In addition, Dr. Falk has expressed concern that the existing motivation instrument is unduly couched in conservation terms and has been testing a revised, more generic form of the instrument.

Phase II: *Conservation Attitude Survey.*

The data for the conservation affect survey should be interpreted with caution. While conducting this evaluation, two issues arose. First, many visitors expressed verbal discontent with this survey and the way certain statements were presented. The word "conservation" is loaded with feelings, emotions, obligations and polarity. I found that using the word conservation while presenting the survey to visitors, in some instances, turned them off to participating. The second issue is again with the word conservation, visitors would agree to take the survey and wanting to express that they are "conservation savvy" would circle the highest number "7" on both the pre and post sides, showing no change when in reality there could have been a change. Moreover,

Hodak (2008) documented that only a percentage of people coming into the OCA are pro-conservation. This being said, this specific survey might not be able to truly test conservation affect and/or discriminate between population groups. Thirdly, even if people answer the questions honestly and neutrally, the instrument does not seem to discriminate among sub groups in the sample as all changes were positive for everyone who filled it out. Since it is unlikely that all visitors have the same experiences or feelings with regard to conservation pre and post visit, it seems clear that the instrument itself needs serious revision to be a useful tool.

Phase III: *Concept Mapping.*

The concept map proved to be an effective tool by enabling the OCA to learn more about their visitors, even though the AZA toolkit suggested using PMM. I think for an Aquarium/Zoo setting, concept maps seem more practicable than PMM in terms of time requirements for the visitor. Most visitors don't mind participating, but only for a short while. This study adds to the growing body of knowledge about how to get good concept maps at informal education institutions, especially zoos and aquariums.

Another suggestion is regarding the concept map prompt. The prompt used for this study was intentionally broad. That being said, attempting to use a more specific prompt to look at a more specific question or exhibit would be interesting. An effective prompt is based upon the outcome the researcher is looking for. For example, if the OCA would like to know more about conservation knowledge of their visitors or

specific conservation messages used in their exhibits, they could formulate a prompt to get answers to those specific questions.

Conclusions and Recommendations:

Phase I: *Motivations Survey Results***:**

Visitors to the Oregon Coast Aquarium come with specific identity-related motivations. These identities in turn drive/mold their experiences during their visit. The motivations expressed during a visit to a zoo or aquarium will directly impact how visitors conduct their visit and what meaning they make from the experience. Thirty-four percent of visitors indicated a clear dominant motivation. Nine percent of visitors were found to have a dual dominant motivation. The two most prominent motivations were found to be professional hobbyist and facilitators for summer audiences and explorers and facilitators for winter audiences.

Phase I Recommendations:

- *Continue Visitor Motivations Survey:* Visitor motivations are the first step in understanding how a visitor will utilize and ultimately learn from the

Aquarium. Understanding motivations will allow the Aquarium to understand the types of visitors that are visiting and what they are looking for when they visit. Having a more in depth understanding of OCA visitorship year round will enable the aquarium to facilitate those motivations in future exhibits and programming. Future studies should use modified versions of the instrument.

Phase I Conclusions:

The Phase I evaluation breaks down Oregon Coast Aquarium visitors' identity related motivations, but it is only the first step. Falk et al. (2007) suggest that a Zoo and Aquarium visitor "enacts" a zoo/aquarium "identity" during their visit; an identity that "situates" their motivations within the realities of that specific visit. They also have found preliminary evidence that suggest that these categories were predictive of learning outcomes. Therefore, meaningful grouping of visitors into their motivations is the first step to understanding the visitor and how to address their needs. The next step is to investigate how the visitor of a specific identity behaves and interacts within the setting, what they intend to do within the setting, and how they process the experience once they leave.

Phase II: *Conservation Attitudes survey results:*
- There is a positive change in conservation attitude pre to post visit: All three overarching categories: 1) individual responsibility 2) attitude toward

zoos/aquariums and 3) human protection of nature exhibited a positive change from pre to post visit.

Phase II Recommendations:

- *Conservation Messages.* If the goal of the Oregon Coast Aquarium is to educate visitors on conservation issues and management on the Oregon Coast, they should slowly incorporate those messages into exhibits around the Aquarium, and then use surveys and/or concept maps to measure the effectiveness of the messages produced. The OCA has piloted this idea in the Hodak (2008) evaluation. Hodak (2008), found that when incorporating conservation related talks into marine mammals feedings, can be an effective tool for relaying conservation related knowledge to OCA visitors.

- In addition to completing a conservation attitudes survey immediately upon leaving, I would recommend administering a follow up survey on conservation attitudes six to eight weeks after a visit to the Aquarium. This will enable the aquarium to better understand the staying power of specific conservation massages.

Phase II Conclusions:

Conservation is an issue that is present in our everyday lives. With issues such as global warming in the media and in our schools, aquariums and zoos across the country are actively playing a role by sending out positive messages regarding conservation and conservation awareness. That being said, it is important to have a free-choice learning tool or survey that can assist in measuring visitor's pre-existing

and gained conservation knowledge from a visit to a zoo or aquarium. There is considerable room for improvement in the quality of the AZA conservation affect survey.

Phase III: *Concept map survey results:*

- Visitors come to the Oregon Coast Aquarium with expectations, through a set of associations, of what they are going to see and experience before a visit, and leave with added knowledge, and changes in their associations.

- As a result of their visit, visitors become more specific in their descriptions of the Aquarium and its animals.

- Visitors are leaving with more complex conceptual structures than those they enter with.

- Visitors mentioned more items related crustaceans and facts learned.

- Visitors come in expecting to see and learn about specific exhibits, sharks, marine mammals and fish.

- Visitors are more likely to mention specific exhibits, crustaceans, birds, and invertebrates when they leave.

Phase III Survey Recommendations:

Continue Concept Maps evaluations: the concept map is a tool that will enable the Oregon Coast Aquarium to gain more insight from their visitors than a normal survey. I would suggest that the aquarium continue using concept maps. Since the aquarium is in the process of increasing their conservation messages around the aquarium, the

concept map tool would be an excellent way to find out if visitors are leaving with the "new" messages that the OCA are attempting to convey.

Phase III Survey Conclusions:

Concept maps are an emerging tool used in free-choice learning settings. Mostly they have been used to gauge visitors' knowledge and/or opinion on a certain exhibit or topic, but they were successful in this evaluation as well. The evaluation suggests that visitors enter the Aquarium with a set of concepts/themes and that those shift and change after a visit. The most important component discovered from this evaluation was that visitors were less inhibited when filling out a concept map than the other surveys conducted. Visitors used the concept map as a way of expressing themselves with pictures and stories. Many visitors drew pictures to describe what their entrance expectations were for their visit as well as many visitors would tell specific stories about their own personal experiences at the Aquarium. This suggests that the concept map is able to capture a different component of visitor information that reaches beyond the typical demographic information of gender, age, and background.

This evaluation uses three survey instruments from the AZA toolkit which was published in 2007. Due to size, location, and interest in learning more about their visitors', The Oregon Coast Aquarium was an optimal location to try out the new tools. Though this study was small in scale, the implications and suggestions are promising towards optimizing the Aquarium's educational outcomes and a better understanding of visitors' perceptions and attitudes.

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A comparison of visitor motivations across three informal education institutions in
Newport, Oregon.

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A comparison of visitor motivations across three informal education institutions in Newport, Oregon.

Abstract

Visitors arrive at informal education institutions with individual museum identities that potentially drive their activity and learning there. Identities are seen here as a confluence of internal and external factors (Holland 1998) that get "activated" during particular activities, rather than being static, fixed, and causative. Several studies suggest that we can begin to explicate visitors' museum identities by examining the motivations expressed during a visit to a zoo or aquarium. This article examines a newly published tool for measuring visitors' motivation at zoos, aquariums and other informal education settings by exploring the ability of the tool to be used outside the realm of zoos and aquariums, for which it was created, and compares motivations across three informal education sites in Newport, Oregon. Two models of visitor identity are discussed and recommendations are made for future uses of the tool by informal science education institutions and researchers.

Key words: motivation, free-choice learning, identities, informal education, aquariums, informal science

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Introduction

As studies of learning in and from experiences in zoos and aquariums (as well as museums in the most general sense) have developed, interest has gradually shifted from visitor behavior during a visit to the factors that shape decisions to visit. The underlying assumption of such work has been that the motivations expressed during a visit to a zoo or aquarium will directly impact how visitors conduct their visit and what meaning they make from the experience.

Pekarik et al. (1999) and Doering and Pekarik (1996), for instance, found that visitors to a museum are likely to enter the museum with a self-reinforcing "entry narrative." The entry narrative is based on the concept that museum visitors are not "blank slates" when they arrive at a museum; they, in fact, visit a museum with an entrance narrative made up of three components: 1) A basic framework or fundamental way that individuals construct and contemplate the world, 2) information about the given content area topic-organized according to that basic framework, and 3) personal experiences, emotions, and memories that verify and support this understanding. Such entry narratives direct visitors' learning and behaviors at the museum. In addition, Doering and Pekarik (1996) state that visitors' perceptions of satisfaction will be directly related to experiences in the museum that resonate with the entry narrative.

Following up the work on entry narratives, Falk (2006) postulates that these entry narratives may be strongly related to a visitor's underlying motivations. In his discussion, motivations appear as types of what Gee (2000) calls "situated identities," highly contextualized ways of being and being recognized as particular kinds of

people engaged in particular kinds of activities. Whereas identity used to be thought of as fixed personal characteristics like ethnic background, socio-economic status, race, or gender, such a formulation focuses on the dynamic, fluid and situated nature of identity (Gee, 2000; Holland, 1998; Wertsch, 2002). From this larger perspective, identities can be thought of as emerging confluences of internal and external factors (Holland 1998) or linguistic (Gee, 2000) and cultural (Wertsch 2002) tools that get "activated" during particular activities, rather than being static, fixed, and causative. Such identities are both shaped by and help shape visits to informal learning venues. A visitor to a zoo or aquarium doesn't just bring a generic identity to their visit; they bring a zoo/aquarium "identity" to their visit, and the visit helps them to enact and, therefore, build or reinforce that particular situated identity. This identity in turn drives/molds their motivations for that specific visit.

But how are researchers and analysts to identify such situated identities in order to understand how they are shaped by visits to informal science venues and shape the learning and experiences that happen there? Efforts in recent years have spanned in-depth ethnographic research (Ellenbogen, 2002) to larger scale interview projects (Packer & Ballantyne, 2002) to large scale multi-institutional analyses (Falk, et. al. 2008). As part of the latter category, in 2004 The Association of Zoos and Aquariums (AZA) formed a strategic partnership with the Institute for Learning Innovation (ILI), and the Monterey Bay Aquarium and undertook a three year, US based study to assess the impacts of a zoo and aquarium visit on adults. Part of that study involved putting a model of situated identities explicated by Falk (2006) to work to in trying to document the motivations of visitors to zoos and aquariums. One result

of that study was the AZA produced "Visitor Impact Toolkit," a series of evaluation tools to be used to better understand visitors. The toolkit was distributed to AZA accredited institutions on CD in summer of 2007. While the toolkit includes several instruments, for this study, only the motivations survey from the AZA toolkit was employed. Our primary motivation was to explore its usefulness in documenting differences and similarities among visitors at three different sites, a large coastal aquarium, a smaller university run aquarium and science center, and a boat-based eco-tour operation. All three are marine science and educational venues with live animal focus all within a few miles of each other in the Western United States.

Conceptual Framework

Studies of visitor motivations have been advanced in recent years as ways to begin the study of visitor identity. Two studies in particular that we will focus on here (Packer & Ballantyne 2002; Falk et al. 2008) conceive of visitor motivations within five-part taxonomies of visitors. Packer & Ballantyne (2002) define visitor motivations as follows: *Learning and Discover,* which they identify as the desire to discover new things, expand knowledge, be better informed and experience something new and unusual; *Social Interaction,* identified as the desire to spend time with friends or family, interact with others and build relationships; *Passive Enjoyment*, the desire to enjoy oneself, to be pleasantly occupied and feel happy and satisfied; *Self-Fulfillment* which they describe as the desire to make things more meaningful, challenge abilities, feel a sense of achievement and develop self-knowledge and self-worth; and, finally,

Restoration, the desire to relax mentally and physically, to have a change from routine and recover from stress and tension.

Similarly, Falk, et. al. (2008) describe five specific situation-related motivations people bring with them on a free-choice visit to a zoo or aquarium: *Explorers* are curiosity driven and have a general interest in discovering more about the subject or content of the institution; *Facilitators* are socially motivated, and their visit is focused primarily on enabling the experience and learning of others in their accompanying group; *Professional Hobbyist*s feel a close tie to the museum content and their professional or hobbyist passions, and their visits are typically motivated by a desire to satisfy a specific content related objective; *Experience Seekers* perceive the museum as an important destination, so their satisfaction derives mainly from having "been there, done that"; and *Spiritual Pilgrims* are primarily seeking to have a contemplative, spiritual and/or restorative experience seeing the museum as a refuge from the work-day world.

As discussed earlier, our primary goal of testing the AZA published motivational toolkit for its application in a variety of settings drove the design and questions of this study:

1) What are the different representative motivations as identified by the AZA motivation instrument at the three informal education institutions for later winter, early spring visitors?

2) To what extent are visitor motivations similar or different at the three sites? Do visitors to the two aquariums have a different set of motivations than those who visit the eco-tour operation?

3) To what extent does the AZA published motivation tool identify and

discriminate among visitors to the three sites in ways that are meaningful to

staff and to researchers?

Method

Setting

Data for this study was collected at three informal science institutions with a

focus on free-choice learning for visitors in a small tourist destination on the Pacific

Coast of the United States. The town that houses all three sites is a small town (less

than 10,000 people) with an economy based on resource extraction (fishing and

lumber), tourism, education, and research (one of the three sites is home to university,

state, and federal researchers and resource managers). The particular institutions were

selected because they represent three different types of informal marine education and

three different types of audience sizes (450,000 per year for the aquarium, 150,000 per

year for the science center, and 16,000 per year for the eco-tour operator).

Procedures

Data was collected from February-March 2008. This time period is considered

winter/spring in terms of annual visitation for all three sites. Each survey was two

pages. The first page was the motivations survey taken from the AZA toolkit (see

appendix X), and the second page contained demographic questions (see Appendix X).

The survey also consisted of a paragraph of information regarding informed consent,

which informed the visitors about the anonymity of the survey.

At the aquarium and science center, unstaffed tables were placed in the entryways of both institutions, and surveys were voluntary. Each table setup consisted of a sign stating survey and survey title, two boxes which contained blank surveys and completed surveys, and instructions for filling out the survey. At the eco-tour operator, surveys were voluntary and were administered to visitors while they waited to board the boat tour.

Participants

At all three sites, all adult visitors over the age of 18 were invited to complete the survey. School groups were excluded from the data collection at all three sites. During the time data was collected, 70-73% of visitors to the aquarium and science center were from the local state while only 46% of the visitors to the eco-tour operator were from the local state. Figure 1 shows that at all three sites, multigenerational groups were the dominant group type of visitors.

Figure 1: Group types of visitors from the three locations.
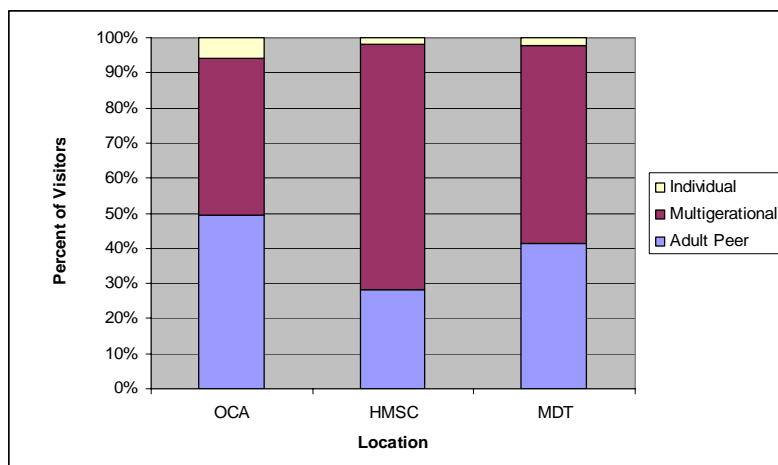
While the types of groups at each site varied, all three sites revealed all three types of

visiting groups: individuals, adult peer groups, and multigenerational groups.

However, at all three sites, a visitor attending as an individual was rare. This is

consistent with claims that up to 80% of visitors to museums visit as part of a group

(Bitgood, Serrel and Thompson, 1992; Falk and Dierking, 1992).

As figure 2 shows, the gender ratio was between 30 male to 70 female and 20

male to 80 female for all three sites. This ratio is consistent with other research that

has been conducted at both the aquarium and science center (Hodak, 2008; Gerhke,

2007), but it is not clear from prior research whether this is an accurate reflection of

the gender makeup of the audience or a result of females being more willing to

participate in filling our surveys.

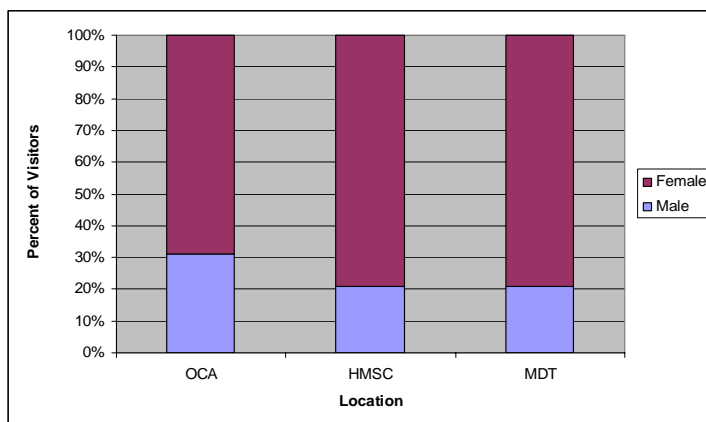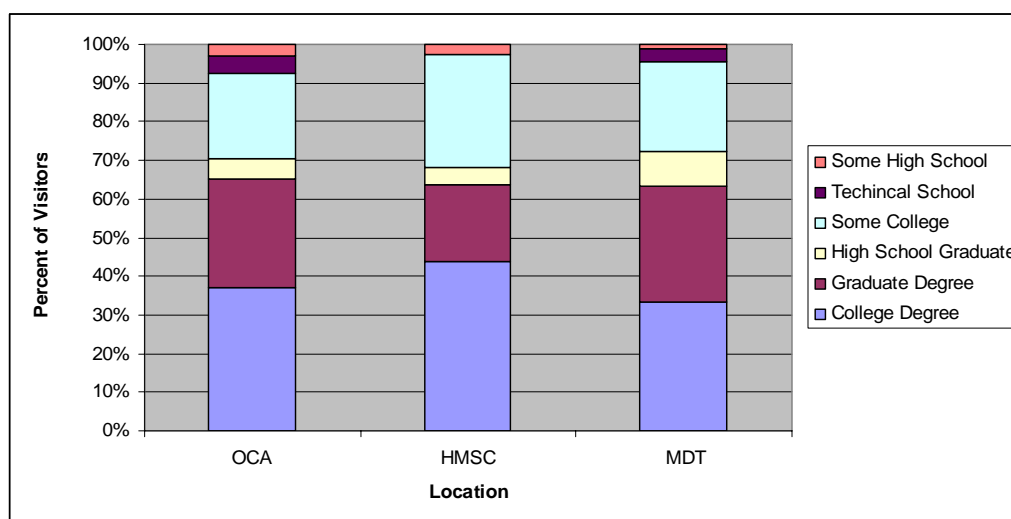Figure 2: Gender breakdown at the three sites.

Figure 3: Education Breakdown of Visitors from the three locations.

The demographic data from all three sites also revealed a highly educated audience. At

all three sites sixty percent or more of the responding visitors report having a college

degree or higher. In 2007, twenty-nine percent of people in the United States reported

to have completed a college degree or higher (www.census.gov), so this is inconsistent

with data for the overall population. Perhaps aquariums, science center and eco-tour

visitors are generally more highly educated than most of the population: Other studies

at the three sites have shown similar education reporting levels (Hodak, 2008; Phipps et. al., in press; Rollins, 2008).

Instrument

The research instrument used in this study was created in a collaborative project which involved the Associations of Zoos and Aquariums (AZA), the Institute for Learning innovation (ILI) and the Monterey Bay Aquarium (MBA). The instrument used is part of a larger toolkit published by the AZA to allow various institutions to research visitors. The survey consists of 20 statements representing four examples from each of the 5 possible motivations identified by Falk (2006); Explorer, Experience Seeker, Facilitator, Professional Hobbyist and Spiritual Pilgrim. Following procedures from the AZA toolkit and Falk, et. al (2008), visitors were asked to select the 5 statements that best explained why they chose to visit the institution on that particular day. For each of the five statements selected, they were then asked to rank them in importance on a seven-point Likert-type scale. They are then placed into one of 6 possible categories: one for each of the motivations listed above and one non-dominant category. We added a seventh category for those who scored dominant in two categories.

Data analysis:

Scores were assigned based on the number chosen on the Likert-type scale for the 5 statements chosen. Since each motivation category is associated with 4 statements, an individual could score a maximum of 28 points for any one of the 5

motivations categories. For instance, an individual who selected all four statements from the same identity-related motivation category and rated each a 7 would receive 28 points. The same person would have to choose one other statement that belonged to a different category (as only 4 statements were associated with each) for which they could score a maximum of 7. A score between 14 and 28 on any given motivation scale was interpreted as indicating a single dominant motivation. If participants had two motivations scoring between 14-28, this was interpreted as a dual dominant motivation. A score below 14 for all/any of the five motivations was interpreted as non-dominant. The analysis followed the methods used by Falk et. al., (2008) for analysis. The spreadsheet that was delivered with the AZA published toolkit was not used as it seemed to use a different method for calculating category scores.

For the discussion below, visitors can be grouped into one of three categories based on how many motivations they scored between 14 and 28 on:

- **A single dominant motivation**. An individual is considered to express a single dominant motivation if he or she indicated a strong motivation (a score a 14 or higher on the survey analysis) within one motivational category.

- **A non-dominant motivation.** An individual is considered to express a non-dominant motivation if all five motivational categories scored below a 14.

- **A dual-dominant motivation.** An individual is considered to express a dual dominate motivation when he or she indicates strong motivations (a score of 14 or more) in two motivational categories simultaneously.

Results

As the following table demonstrates, all of the motivation types were found at each site. Consistent with data from the AZA study reported in Falk, et. al. (2008), there is a preponderance of explorers and facilitators with professional hobbyists as the third largest category. Experience seekers and spiritual pilgrims make up the smallest groups across the three sites. The table also shows that around half of participants across sites have no dominant motivation and that between 3.6 and 8.6 percent of respondents were dual-dominant. The next sections go into more detail on each site.

Table 1: Percent of Respondents falling into the 5 possible motivations. Using 14-28 point scale for defining dominant motivations following Falk et. al. (2008)

OCA		HMSC		MDT	
Motivation	**% of Visitors**	**Motivation**	**% of Visitors**	**Motivation**	**% of Visitors**
Experience Seekers	3.6	Experience Seekers	6.2	Experience Seekers	2.2
Explorers	13.0	Explorers	7.1	Explorers	14.1
Facilitators	11.5	Facilitators	11.5	Facilitators	18.5
Professional Hobbyist	8.6	Professional Hobbyist	15.9	Professional Hobbyist	5.4
Spiritual Pilgrim	6.5	Spiritual Pilgrim	1.8	Spiritual Pilgrim	2.2
Non-Dominant	48.2	Non-Dominant	53.9	Non-Dominant	51.1
Dual-Dominant	8.6	Dual-Dominant	3.6	Dual-Dominant	6.5

Oregon Coast Aquarium (OCA)

Explorers and facilitators were the top dominant representative motivations at the aquarium. For this study, they were mostly female and well-educated, but were associated with different types of visiting groups.

Thirteen percent of visitors to the Oregon Coast Aquarium were found to have an Explorer motivation. 61.1% of Explorers are female and 38.8% of Explorers are male. 61.1% of Explorers have a College Degree or Higher. Explorers are coming to the aquarium, and they are relatively well educated. They are potentially well positioned to have a base knowledge about aquariums or marine life and may be seeking out new and exciting information. 66.6% of explorers visit with an adult peer group while 33.4% of Explorers visit with a multigenerational group. The age range for Explorers was very broad and range from 18 to 60 years old.

Eleven and a half percent (11.5 %) of visitors to the Oregon Coast Aquarium indicated a clear single dominant Facilitator motivation. 75% of OCA Facilitators were female, and 83.1% of Facilitators have a College degree or higher.18.8% of OCA facilitators came to the OCA in an Adult Peer group whereas 81.2% of them came in a multigenerational group. 68.8% of Facilitators reported being between 31-40 years old. OCA facilitators are thus largely well-educated, female parents, grandparents, or group leaders.

8.6% of Oregon Coast Aquarium visitors indicated a dual dominant motivation. Of visitors who indicated dual dominance, for 75% of them one of the two motivations chosen was either explorer or facilitator. 75% of dual dominant visitors came to the OCA in an Adult peer group whereas 25% of them came in a

multigenerational group. The age range for dual dominant visitors was broad, ranging from 22 to 70 years old.

Figure 4: OCA motivations, a comparison of gender, educational background and group dynamics.

OCA Motivations: A comparison of three variables
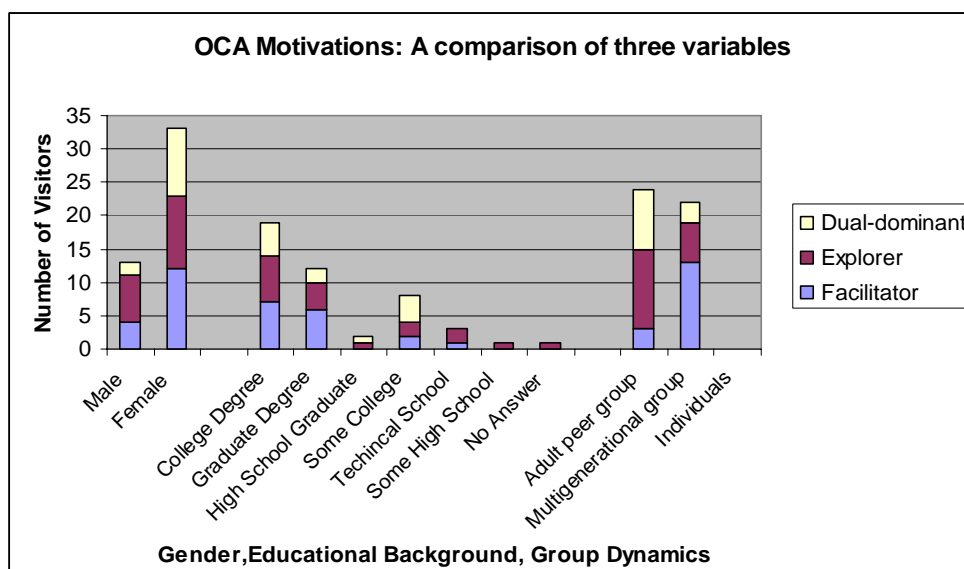
Marine Discovery Tours (MDT)

As at the aquarium, Explorers and Facilitators were the two most dominant motivations present in the pool of respondents at the eco-tour operator. Visitors to the eco-tour operator, however, appeared to be less homogenous than aquarium visitors in terms of gender, but they are also relatively well-educated and usually traveling with multigenerational groups.

14.1% of visitors to MDT indicated a single dominant explorer motivation. This is only very slightly higher than at OCA. However, in terms of gender, they are quite different. 46.2% of Explorers at MDT were female, and 53.8% were male. The age range for explorers at MDT was found to be very broad (ages 18-70), and the

explorers were spread evenly across this range. Like their OCA counterparts, 61.5% of MDT explorers have a college degree or higher. 53.8% of explorers came to MDT as an adult peer group whereas 46.2% came in a multigenerational group.

18.5% of visitors to MDT indicated a single dominant facilitator motivation, the highest single dominant motivation at any of the sites. 58.8% of facilitators were female, and 29.4% were male, with 11.8% of respondents not reporting gender. 58.8% of facilitators at MDT report having a college degree or higher. As at the aquarium, facilitators are most likely to be part of a family or multigenerational group: 17.6% of facilitators came to MDT as an adult peer group whereas 74.7% came as a multigenerational group.

6.5 % of visitors indicated a dual dominant motivation. 66.6% of dual dominant visitors were female, and 33.3% were male, with 2 % of respondents not reporting gender. 66.6% of dual dominant visitors were visiting in an adult per group and 33.3% of them came visited in a multigenerational group. The age range of dual dominant visitors was reported to be from 31-60 years old.

Figure 5: MDT motivations, a comparison of gender, educational background and group dynamics.
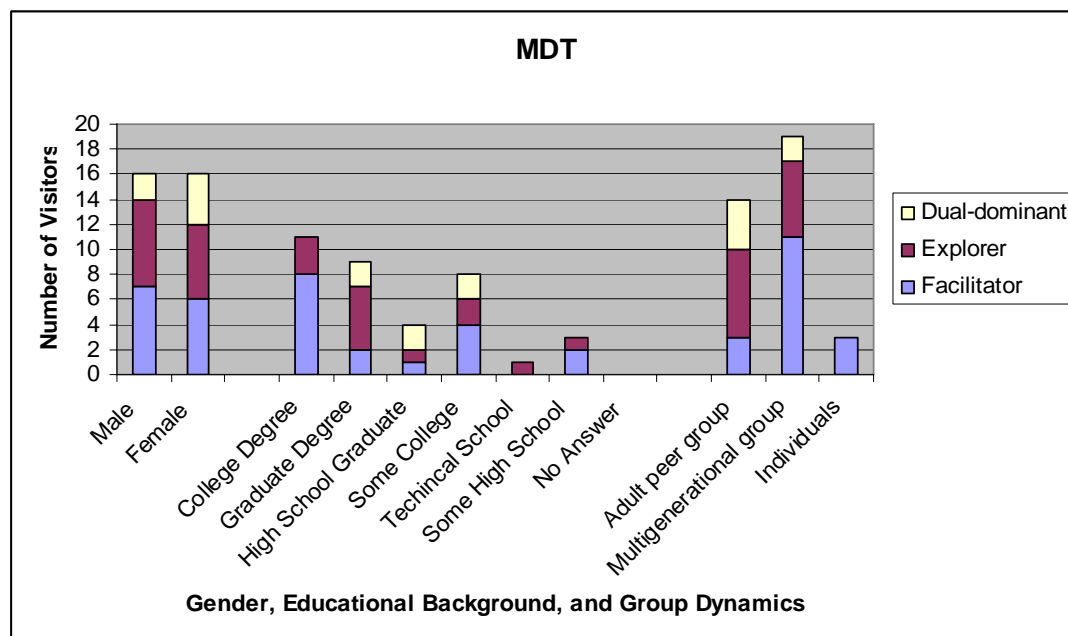
Hatfield Marine Science Center (HMSC)

Unlike both the aquarium and the eco-tour operator, professional hobbyists were primary motivation type at the science center, followed by facilitators. The science center seems to draw substantially fewer explorers than either of the other two institutions. At the same time, it draws a substantially larger percentage of professional hobbyists. As is the case across the board with the top single dominant motivations, both facilitators and in this case professional hobbyists are most likely to be well-educated females in a multigenerational group.

11.5% of visitors to HMSC indicated a dominant Facilitator motivation. 61.5% of facilitators at HMSC were female, and 38.5% of them were male. 53.8% of facilitators were between the ages of 31 and 40. 61.5% of facilitators have a college degree or higher. 53.8 % of Facilitators reported being between the ages of 31 to 40

years old. Most striking of all, 100% of facilitators to HMSC came in a multigenerational group.

15.9% of visitors to HMSC indicated a dominant professional hobbyist motivation. The vast majority (88.8%) were female. 44.4% of professional hobbyists were between the ages of 41-50, so they are a slightly older crowd than those who identified as facilitators. 66.6% of professional hobbyist have a college degree or higher. 33.3 % of Professional Hobby were between the ages of 22-30 and 44.4% of were between the ages of 41-50. 44.4% of PH came to HMSC with an Adult Peer group were as 55.6% came to HMSC as a multigenerational group.

75 % of dual dominant visitors were female and 25% were male. All dual dominant motivations contained Explorer as one of the two motivations indicated. 75% of dual dominant visitors have a college degree or higher. 50% of dual dominant visitors came to HMSC as an adult peer group and 50% came as a multigenerational group. The age range of dual dominant visitors' was between 31 and 70 years old.

Figure 6: HMSC motivations, a comparison of gender, educational background and group dynamics.
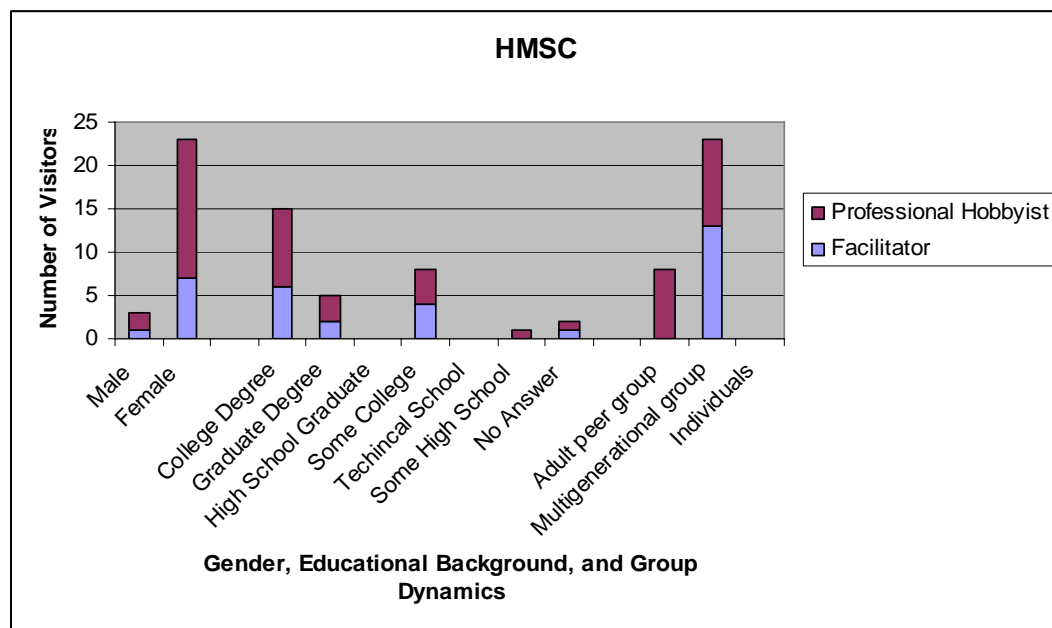
Discussion

Motivations

Facilitators are a strong dominant motivation across all 3 sites. Being that they are all informal science centers catering to families in their advertising and programming, this is not surprising. Those who identify as facilitators at all three sites are mostly female and educated; however, the types of groups that they are part of are different among the three sites. Both aquarium and eco-tour facilitators visit in both adult peer and multigenerational groups whereas HMSC is 100% multigenerational groups.

Explorers at both the aquarium and the eco-tour operator were considerably similar in terms of educational background, visiting group type, and the broadness of ages represented. Visitors at the science center on the other hand exhibit a clear

dominant professional hobbyist motivation. This is perhaps due to the nature of programming at the science center or its association with a large state university and research scientists. If professional hobbyists are visiting largely because they are interested in going to places that satisfy their own personal and specialized interests, they may perceive the university science center as more able to satisfy those needs.

The two under-represented motivations at all three sites tend to be spiritual pilgrims and experience seekers. The percentage of visitors expressing these two motivations was very small. This was consistent with Falk et. al. (2008) findings. However it is interesting to note, that the aquarium did have the largest percent of spiritual pilgrims of the three locations. Visitors may associate aquariums with being relaxing, beautiful, and restorative in a way that a boat tour or a science center is not. Just as the science center may be supporting professional hobbyists through its association with the university and its choices of programming, choices made at the aquarium to incorporate artwork into exhibits, even into tanks, as a more or less "natural" part of the experience may be supporting spiritual pilgrims.

There might be a tendency to dismiss an instrument that does not discriminate meaningfully among half of respondents. What does that tell the institutions using this survey? Past research on motivations has suggested that people come in with multiple motivations, not necessarily just one. While each member of a group may certainly have their own motivations, most individual visitors may be attending for a variety of reasons and to fulfill a variety of identity related purposes. This is seen by the results of the survey showing roughly half of visitors' at all three sites as "non-dominant." Past experience, culture, and educational all shape a person's motivations and in turn

may suggest multiple motivations for attending. If a visitor has more than two particular reasons for attending, they appear as non-dominant. Falk et al. (2008) shows similar motivational patterns in terms of non-dominant across various zoos and aquariums (regardless of sample size).

Instrument

We found that the AZA motivation instrument was easy for visitors to use, easy to analyze, and able to shed new light on visitors to informal science institutions beyond zoos and aquariums. Included in the AZA toolkit is a spreadsheet file which was created to assist in data entry and analysis of the motivations data. Using this file, more than three-fourths of our respondents appeared as non-dominant, and no dual dominant motivations were evident. As this was inconsistent with the findings from the same instrument published in Falk, et. al., (2008) and after consulting the developers of the instrument, we abandoned the AZA published spreadsheet and followed the analytical procedure in Falk, et. al. (2008). Using the 14 point cut off system described above for identifying dominant motivations and ignoring the spreadsheet packaged with the AZA toolkit enhances the data and the information it gives provides.

As discussed earlier, Falk et. al. and Packer and Ballantyne share similarities with regards to how they describe visitors' incoming motivations. For instance, Falk, et. al.'s Explorer is certainly similar to Packer and Ballantyne's experience of Learning and Discovery. The Falk et. al. (2008) descriptions of motivations seem to be based on descriptions of activities and motivations for those activities whereas

Packer and Ballentyne (2002) seem to be more grounded in individual's tendencies or desires. That being said, to optimize the understanding of motivations and interpreting the results of future motivational survey, these two taxonomies might be combined. Two approaches might be useful. The first would be to design a research project to apply both sets of taxonomies to the same people to see if and how the two separate descriptions do indeed overlap or possibly describe distinct and separate categories. A second approach might be to combine the two sets of categories and create new instruments based on the resulting categories. We would suggest, for instance, the following six categories

Explorers/Discovery

Facilitators/Social interaction

Spiritual Pilgrims/Restoration

Passive Enjoyment

Self-Fulfillment (with a sub category of Professional Hobbyists)

Experience Seekers

Such a revised taxonomy potentially extends the explanatory efficacy of both earlier studies and the reach of the Falk et. al. (2007) instrument to more clearly identify the large number of non-dominant motivations that it reports.

Gender

One puzzling aspect of this study is the very high percentage of female respondents relative to male respondents. Specifically, between 70% and 80% of respondents were female. We made no attempt at random selection in this exploratory

research, opting instead for reaching all the visitors. We also have no real data from any of the sites on gender representation among visitors. However, other recent research at all three sites (Hodak, 2008; Gehrke, 2007; Nickels, 2008; Rollins, 2008) that in some cases did employ random sampling procedures found very similar ratios. More work needs to be done at each site to determine whether the over-representation of females in these and other samples is a more or less accurate reflection of the visiting publics or due to other factors.

Conclusions

As this study shows, the motivation survey was able to give all three institutions a view of what types of visitors (based on their motivations) are visiting their institutions. Moreover, when this data is compared with similar data gathered at the participating aquarium in the summer of 2007 (Nickels, 2008), it was shown that the motivations of visitors change seasonally. Understanding visitor motivations will enable the institutions to create or modify displays, exhibits, marketing, and programming as well as identifying realistic learning outcomes for a visit. In addition, institutions might use this instrument to understand how better to expand their audiences over time by giving more attention to the neglected types of visitor motivations (Pekarik et al. 1999). In this case, where three institutions that are very close geographically and certainly could benefit from shared marketing and promotion, understanding to what extent their audiences are shared, and share motivations and expectations can help in making all kinds of joint marketing

decisions. Lastly, the motivations survey not only has the potential to describe the characteristics of visitors. It also has the potential to simultaneously reflect the characteristics of the institutions (Pekarik et al, 1999), serving as a part of a description of what makes each site unique and important to a community of users.

Motivations and identities that shape those motivations are difficult to measure. No two visitors ever have exactly the same motivations for visiting an informal education institution. The AZA published motivations survey allows us to begin to paint a broad picture of visitors' motivations present in these three institutions. We believe that it is therefore usable in a wide variety of informal science educational institutions with a focus on free-choice learning, both for researchers interested in motivation and decision makers thinking about audience needs and developing new audiences. Understanding motivations could in turn assist in understanding visitors overall learning outcomes as well as how to better satiate different types of visitors needs. Falk (personal communication, June 16, 2008) has also suggested the need to revise the AZA instrument to be less explicitly focused on conservation in order to make it useable to a larger group of institutions. We believe a revised instrument that incorporates further categories identified by other research would be a valuable tool for informal science education institutions as well as researchers interested in both motivation and situated identities.

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Conclusions

Informal education institutions such as science centers, zoos, and aquariums, would like to know more about their visitors (more than basic demographics), especially in terms of what they know and what they expect when they come to visit and what motivates them to be there. Several tools have been proposed as useful additions to the toolkit for understanding visitors (AZA, 2007; Falk et. al., 2007). This study set out to test the feasibility of using these tools for evaluation and comparative research.

There is some basic visitor information, which is not reported in either manuscript, but which I felt it was important to discuss in the conclusion. While collecting motivations surveys for the second manuscript, I also thought it would be interesting to collect data on where visitors at each institution were visiting. More specifically I wanted to see if there was "crossover" or exchange visitation occurring. This information had never been collected before for these three sites despite the fact that there is a general belief at all three sites that they do in fact share visitors. As part of data collection, I set out to find out if visitors who went to MDT also go to HMSC or OCA and vice versa?

Figure 1: Where are visitors going? Percent of visitors who visit more than one site.
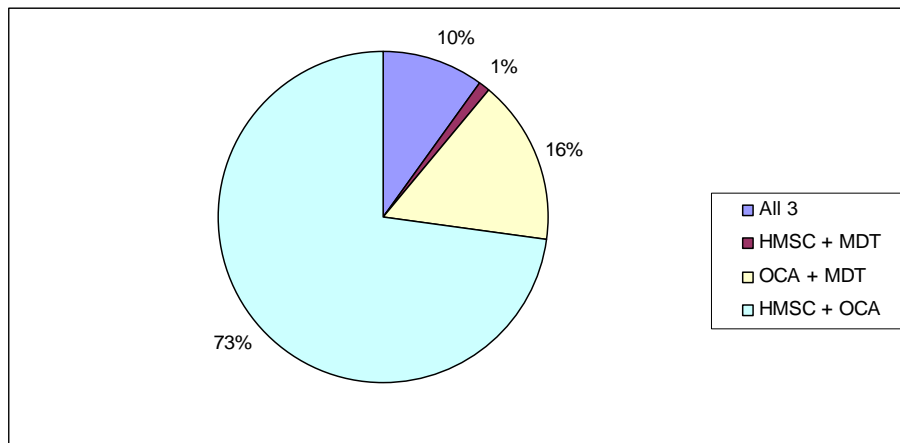
From figure 1, twenty-three percent of visitors reported going to more than one

institution during the year. Of those visitors', seventy-three percent of visitors visit

both HMSC and OCA during a calendar year followed by sixteen percent of visitors

visiting both OCA and MDT. Surprisingly, only one percent of visitors reported

visiting both HMSC and MDT. This trend is expanded in figure 1 below.

Figure 2: From each site (OCA, HMSC, and MDT), the percent of visitors' visiting other sites.
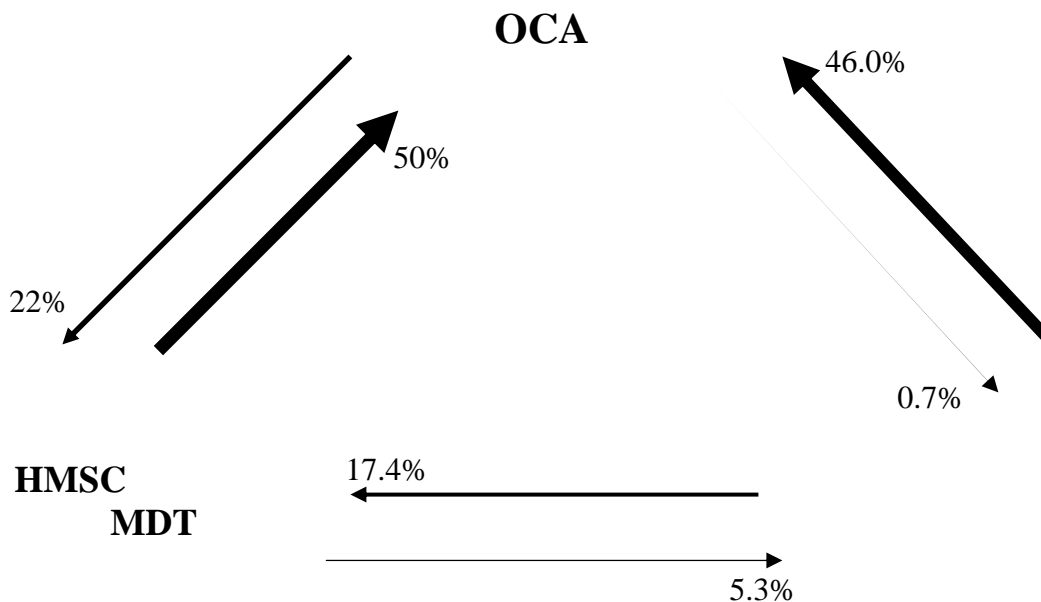
Figure 2 illustrates where visitors from each institution reported visiting in one calendar year. Size of arrows is correlated to percentage. For instance, while 50% of HMSC respondents also reported visiting OCA, only 5.3% of them reported visiting MDT. Similarly, while 50% of HMSC respondents also reported attending OCA, only 22% of OCA respondents reported visiting HMSC. OCA is certainly the largest draw in Newport from this point of view, as roughly fifty percent of visitors from both HMSC and MDT also visit OCA. However, less than one percent of visitors from OCA reported visiting MDT.

Table 1: Where visitors coming from? Data from demographic survey (winter 2008)

OCA	HMSC	MDT
70.5% from Oregon	73.5 % from Oregon	46% from Oregon
82% from Pacific Northwest (Alaska, Oregon, Washington and BC)	75% from Pacific Northwest	54 % from Pacific NW 40% from West and Mid-west (Utah, Colorado, Montana, Nevada, Arizona, Idaho, New Mexico, Illinois, Indiana, Iowa, Michigan, Minnesota, Wisconsin)

I was also interested in documenting where visitors to all three sites are coming from and how they relate. Seventy percent of visitors from both OCA and HMSC report being from Oregon, where as MDT visitors forty-six percent report they are from Oregon. It is interesting to compare these winter/spring numbers to the summer numbers collected at OCA and reported in the first manuscript. Only 44% of respondents in summer at OCA came from the Pacific Northwest. Even more

interesting is though OCA and HMSC seem to have similar "Oregon" visitors, as the second manuscript shows, these motivations of these visitors at the two sites are different.

Implications for future research

Besides what is outlined in the manuscripts, there are a few areas that I feel are important for guiding future research as well as assisting the OCA, HMSC, and MDT to better understand their visitors.

Concept Mapping

Concept maps have been used for a variety of reasons in aquariums and science centers. Most commonly they are used to track changes in knowledge about specific conceptual areas as a result of an experience. In this study, in addition to looking at changes of depth and breadth within particular visitor identified conceptual categories that resulted from the visit, the concept mapping tool showed great potential as a tool for documenting visitors' incoming associations (and thus expectations) for a visit to the Oregon Coast Aquarium and how those associations changed immediately after the visit. Such a tool might be used to track expectations about exhibitions and effects of visiting both permanent collections and temporary exhibitions.

While collecting data at the OCA during the summer of 2007, the OCA had a temporary exhibit titled "CLAWS" which focused on adaptations and diversity of crabs, lobsters, shrimp, isopods and copepods. This exhibit had more or less extensive marketing throughout the Northwest through mailings, newspaper ads, billboards and commercials. Though most of the pre-maps said nothing about crustaceans and crabs,

the number of visitors that discussed crustaceans on their post-maps significantly increased ($p < 0.00$). This data suggests that visitors had come to the Oregon Coast Aquarium with no expectations of seeing crustaceans and/or not associating the aquarium with crustaceans. However, when the visitors leave, they are not only associating crustaceans with their trip, but they also they leave with added knowledge about specific crustacean species i.e. where they live, what they eat, and exhibit which demonstrates shifts in those expectations.

Concept mapping can be a great tool to document what kinds of programming and or exhibits have an immediate impact on visitors. OCA can also use this tool to see if new exhibits have staying power once visitors are exiting the OCA as well as whether or not knowledge is gain from these exhibits. For example, the new temporary exhibit "Oddwater" opens in spring 2008, and the aquarium has placed conservation messages throughout the exhibit. I think pre-post concept maps of visitors would be an excellent method to see if those messages are being absorbed by the visitors. Visitors to the aquarium do not spend much time reading labels of any kind (Gehrke, 2007) especially the few conservation-themed labels (Hodak, 2008). It would be interesting to track, using concept maps, visitors' expectations about learning about conservation and their feelings about whether they learned about conservation or not as a result of their visit to Oddwater. If they do, the temporary exhibition can serve as a model for redesigning elements of the permanent collection.

Motivations survey

The motivation tool was used at the OCA in the summer of 2007 and in the winter of 2008. The results of the surveys revealed that in the summer of 2007, the two most prevalent visitor motivations were professional hobbyist and facilitators. However, in the winter of 2008, the two most prevalent motivations were explorers and facilitators. Since the OCA is an informal education institution and a place dominated by family groups, having facilitators be a dominate motivation was not surprising. However, the other dominant motivation changing from a professional hobbyist to explorer was very interesting. Using the Falk et. al. (2008) definitions, the visitor motivations transitioned from a professional hobbyist (during the summer) who is a visitor whose primary motivation is very specific and is interested in more specific aquarium content to an explorer (during the winter) whose primary motivation is more based on curiosity and has a more general interest in aquarium content. That being said, the motivations tool was able to successfully document variations in visitors during summer and winter seasons. Understanding the change in visitorship during the seasons will allow the OCA to effectively provide programming, exhibits and marketing towards those specific motivation as well as attempt to draw in motivations that were underrepresented.

Another finding of the motivations survey was that the tool was able to be used successfully outside of the "aquaria" setting at both a science center (HMSC) and an eco-tourism boat excursion company (MDT). The motivation survey was created by the AZA for AZA institutions. My results reveal that this kind of tool can also be used

in other setting other than aquarium, where it was originally designed and tested (Falk et. al. 2006; Falk et. al, 2007).

Moreover, the tool allowed us to compare visitor motivations across all three informal marine education sites in Newport, Oregon. This demonstrates that a tool like this can be used to "fine tune" an institutions' understanding of their audience, and for the institutions that share an audience, to understand what make a visit to each institution unique. This has marketing, educational, and membership implications.

Implications for sites

I think that both the motivations tool and the concept map tool would be a great addition to all three sites for future visitor's evaluation studies. The concept maps indicate that the "new" seasonal exhibits at the OCA have a lasting impression on exiting visitors. Using "new" or seasonal exhibits to relay conservation messages could be an optimal way to get new information to visitors. The OCA could continue to use concept maps to measure this and other themes. It is also important to mention that my results revealing concept maps as a effective tool to use in informal education institutions has also been document in past graduate student research projects (Christensen, 2007; Rollins, 2008).

The motivation survey was able to give all three institutions a view of what types of visitors (based on their motivations) are visiting their institutions. Moreover, at the OCA, it was shown that the motivations of visitors changes seasonally. Understanding visitor motivations will enable the institutions to use info to create or modify displays, exhibits, marketing, and programming. In addition, institutions will

have the ability to shape their museum audiences by manipulating the type/kind of exhibits and experiences they offer. The type of exhibits and the experiences the institution offers will shape the museum audience, will affect the rate of repeat visitation and overall satisfaction of the visitors. It will also be possible for institutions to expand their audiences over time by giving more attention to the neglected types of visitor motivations (Pekarik et al. 1999).

Some institutions could be alarmed at the idea of prioritizing exhibits, marketing etc on specific motivational groups instead of the overall general public. However, I don't think that should be the case. As Doering and Pekarik (1996) state, the visitor, not the institution drives the visitor's experiences in a museum. The visitor uses the material from museum exhibits and programming to construct new experiences that are both unique to the individual and potentially satisfying within the identity-construct that has already shaped him or her (Falk, 2006).

Implications for research: Limitations and Strengths

Instruments

Conservation attitudes survey. The data for the conservation affect survey should be interpreted with caution. While conducting this evaluation two issues arose. The first issue was that many visitors expressed verbal discontent with this survey and the way certain statements were presented. The word "conservation" is loaded with feelings, emotions, obligations and polarity. I found that using the word conservation while presenting the survey to visitors, in some instances, turned them off to participating.

The second issue is again with the word conservation; visitors would agree to take the survey and wanting to express that they are "conservation savvy" would circle the highest number "7" on both the pre and post sides, showing no change when in reality there could have been a change. More over, in Hodak (2008), it was documented that only a percentage of people coming into the OCA are pro-conservation. This being said, this specific survey might not be able to truly test conservation affect and/or discriminate between population groups. Thirdly, even if people answer the questions honestly and neutrally, the instrument does not seem to discriminate among sub groups in the sample as all changes were positive for everyone who filled it out.

Concept mapping. The concept map proved to be an effective tool though the AZA toolkit used PPM, which involves an interview process, the concept maps still enabled the OCA to learn more about their visitors. I think for an Aquarium/Zoo setting, concept maps seem more practicable and PMM in terms of time requirements of the visitor. Most visitors don't mind participating, but only for a short while.

Another important trend discovered when analyzing the maps is that most visitors used the maps as a way of expressing themselves. Visitors would express themselves by using drawings, giving personal information, and telling personal stories about their experiences. Roughly 30% of visitors used drawings to express themselves and their concepts with both pre and post maps. This shows evidence that concept maps fulfill what linguists call an expressivist function in addition to a simple indexical function (Taylor, 1995). Indexing is using language to name things in the world, or point them out to someone else. Expressing has more to do with generating

meaning, creating connections among ideas and things. It is important to note that lots of learning experiences are based on getting people to be better indexers rather than expressers.

Due to the fact that concept maps allow a visitor the freedom to write down anything they are thinking or feeling enables the concept map to capture information beyond the classic demographic information. This can enable the aquarium to get a more complete understanding of their visitors. Since the aquarium is in the process of increasing their conservation messages around the aquarium, the concept map tool would be an excellent way to find out if visitors are leaving with the "new" messages that the OCA are attempting to convey.

Motivations survey. Falk et al. (2007) suggest that a Zoo and Aquarium visitor "enacts" a zoo/aquarium "identity" during their visit; an identity that "situates" their motivations within the realities of that specific visit. They also have found preliminary evidence that suggest that these categories were predictive of learning outcomes. Therefore, meaningful grouping of visitors into their motivations is the first step to understanding the visitor and how to address their specific needs during a visit.

Comparing motivations from summer OCA to Winter OCA, it is evidence that the motivations of visitors changes seasonal, which could suggest that the overall visitorship changes seasonal. Moreover, the motivations of visitors at OCA and HMSC during the winter months are different from each other.

The motivations tool is useful as a beginning step to meaningfully categorizing visitors to free-choice learning institutions. I say beginning, because I think that the

tool only touches the surface of visitor motivation. Past research on motivations has suggested that people come in with multiple motivations, not necessarily just one. This is seen by the results of the survey showing 50% of visitors as "non-dominant". Past experience, culture, and educational all shape a person's motivations and in turn could cause 50% of the visitors to have more than 2 motivations for visiting. The survey is unable to break down the motivations further than two.

As discussed in the second manuscript, Packer and Ballantyne (2002) and Falk et. al., (2008) have two varying ways in defining the motivational categories. In that manuscript, we offer suggestions for combining these two definitions to create a hybrid set of 6 categories. Doing this would more effectively describe each of the categories and perhaps capture the large number of people whom the AZA instrument listed as non-dominant. I also suggest using Falk's revised instrument for further studies as it will have less explicit conservation focus.

As described above, the OCA has a seasonal exhibit, "Oddwater," which opens in spring 2008. This exhibit differs from most due to the fact that in all the fish tanks contain glass art work which is used instead of natural habitat. In addition, another art work display has also been put up in the tunnels of passages of the deep. This being said, it would be really interesting to use the motivations tool in the summer 2008 to see if this exhibition of art work draws in a different motivational crowd i.e. professional hobbyist and spiritual pilgrims to the aquarium.

Motivations and identities that shape those motivations are difficult to measure. No two visitors ever have the motivations. The motivations survey allows us

to paint a broad picture of visitors' motivations present in these three institutions. Understanding motivations could in turn assist in understanding visitors overall learning outcomes as well as how to better satiate different types of visitors needs.

Gender. As seen in my demographic data, the male to female ratio is skewed. Males to females were found to be consistently 30:70 whether data was collected using random or voluntary sampling methods. This ratio is also consistent with other research that has been conducted at both the OCA and HMSC (Hodak, 2008; Phipps, et. al. 2008). Pekarik et al. (1999), found that gender was significant in terms of the experience visitors chose. Males visitors were more likely to choose cognitive experiences (visitors who find their primary satisfaction in the interpretative or intellectual aspects of the experience) than females who where more likely to choose introspective experiences. Due to this fact, the differences between males and females could affect the outcome of the results. That being said, I would suggest that further research to be done to figure out the gender bias. This can be done by having staff members do door counts, where someone documents the number and gender of every visitor. Another way to evaluate gender is to do random sampling and document the rejection rates. Rejection rates would enable a researcher to evaluate if in fact females are more inclined to fill out surveys more the males, which could be a driving force of this consistent gender ratio.

Ocean Literacy. Marine policy and ocean literacy are intertwined with each other. The Pew Ocean Commission (2003) and the US Commission on Ocean Policy (2004)

both published highly publicized reports on the state of our oceans. In those reports, they both strongly recommend an increase in our society's ocean literacy. In order to increase society's overall ocean literacy, informal education institutions need to know more about their visitors. Understanding visitors' expectations and motivations for visiting informal education institutions in turn assist in: 1) understanding visitors overall learning outcomes and 2) how to better satiate different types of visitors needs. Being able to know who is visiting and even those who are not visiting will enable institutions to satisfy current visitors' needs as well as attract people that would not necessarily consider visiting. Attracting a new audience and increasing visitorship to these sites, will in turn assist in increasing ocean literacy.

Implications for outside the aquaria setting

As seen from the motivations survey, I think that the tools from the AZA toolkit do have the potential to be used outside the aquarium/zoo realm. I think that these tools are more than appropriate for any free-choice learning institution that wants to understand their visitors more thoroughly. The AZA toolkit is a working document and there is always room for improvement, moreover, some of the surveys used in this study have already been rewritten to optimize their effectiveness. Another factor involved in making a visitor study effective is man power. If facilities have the people to use these tools, I think the results will give the institutions added insights.

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Appendix A: Conservation attitude survey

How Much Do You Agree With Each Statement?

Circle a number in each row think of how you felt **BEFORE** your visit and then rate each sentence as to how you feel **NOW**.

BEFORE VISIT Not at all…Completely		NOW Not at All…Completely
1 2 3 4 5 6 7	Being at the zoo/aquarium is fun	1 2 3 4 5 6 7
1 2 3 4 5 6 7	I am part of the problems with nature	1 2 3 4 5 6 7
1 2 3 4 5 6 7	I am part of the solutions to nature's problems	1 2 3 4 5 6 7
1 2 3 4 5 6 7	Zoos/aquariums care about animals	1 2 3 4 5 6 7
1 2 3 4 5 6 7	Zoos/aquariums are important for wildlife conservation	1 2 3 4 5 6 7
1 2 3 4 5 6 7	Animals are amazing	1 2 3 4 5 6 7
1 2 3 4 5 6 7	We need to help protect animals	1 2 3 4 5 6 7
1 2 3 4 5 6 7	We need to help protect plants	1 2 3 4 5 6 7
1 2 3 4 5 6 7	There is a lot I can do to conserve	1 2 3 4 5 6 7
1 2 3 4 5 6 7	There is not much I can do to help nature	1 2 3 4 5 6 7
1 2 3 4 5 6 7	Nature helps define America's national heritage and character	1 2 3 4 5 6 7
1 2 3 4 5 6 7	Nature is a place to renew the human spirit	1 2 3 4 5 6 7
1 2 3 4 5 6 7	We have the responsibility to leave healthy ecosystems for our families and future generations	1 2 3 4 5 6 7

AGE ____ Been here before? No ___ Once or twice ___ Number of times ___ Come often ___

THANK YOU!!

Appendix B: Motivations survey

ID#:   TIME: DATE:

Why are you here today?

Check the 5 that best reflect why you are here today.

For those 5 statements only, indicate the importance of the reason.
? If a statement represents a **very important reason you are here today**, you would circle **7**.
? If a statement represents a **less important reason you are here today**, you would circle **1**.

Check 5

		Less Important Reason					More Important Reason
☐	…I like the types of things I can learn here	1 2 3 4 5 6 7					
☐	…I came a long time ago and want to revisit it	1 2 3 4 5 6 7					
☐	…I actively support conservation and the protection of wildlife	1 2 3 4 5 6 7					
☐	…It is one of the best places to visit around here	1 2 3 4 5 6 7					
☐	…I support conservation	1 2 3 4 5 6 7					
☐	…the many different species fill me with wonder	1 2 3 4 5 6 7					
☐	…my wife/partner/husband made me come	1 2 3 4 5 6 7					
☐	…I discover things about myself when I come here	1 2 3 4 5 6 7					
☐	…I frequently visit zoos/aquariums when I go on trips	1 2 3 4 5 6 7					
☐	…I get more here than going to the mall or a movie	1 2 3 4 5 6 7					
☐	…It was my choice for how to spend the day	1 2 3 4 5 6 7					
☐	…I support the mission to study, celebrate and protect animals	1 2 3 4 5 6 7					
☐	…my family/friends have good experiences here	1 2 3 4 5 6 7					
☐	…this is a good way for my family/friends to share quality time	1 2 3 4 5 6 7					
☐	…I feel at peace in these surroundings	1 2 3 4 5 6 7					
☐	…my family/friends enjoy themselves here	1 2 3 4 5 6 7					
☐	…coming here helps me appreciate nature	1 2 3 4 5 6 7					
☐	…I like to watch the animals	1 2 3 4 5 6 7					
☐	…I like to study wildlife	1 2 3 4 5 6 7					
☐	…this is an important institution in this community	1 2 3 4 5 6 7					

AGE ___ **Been here before?** No ___ Once or twice ___ Number of times ___ Come often ___

123

Appendix C1: Sample Map; pre map visitor # 331

124
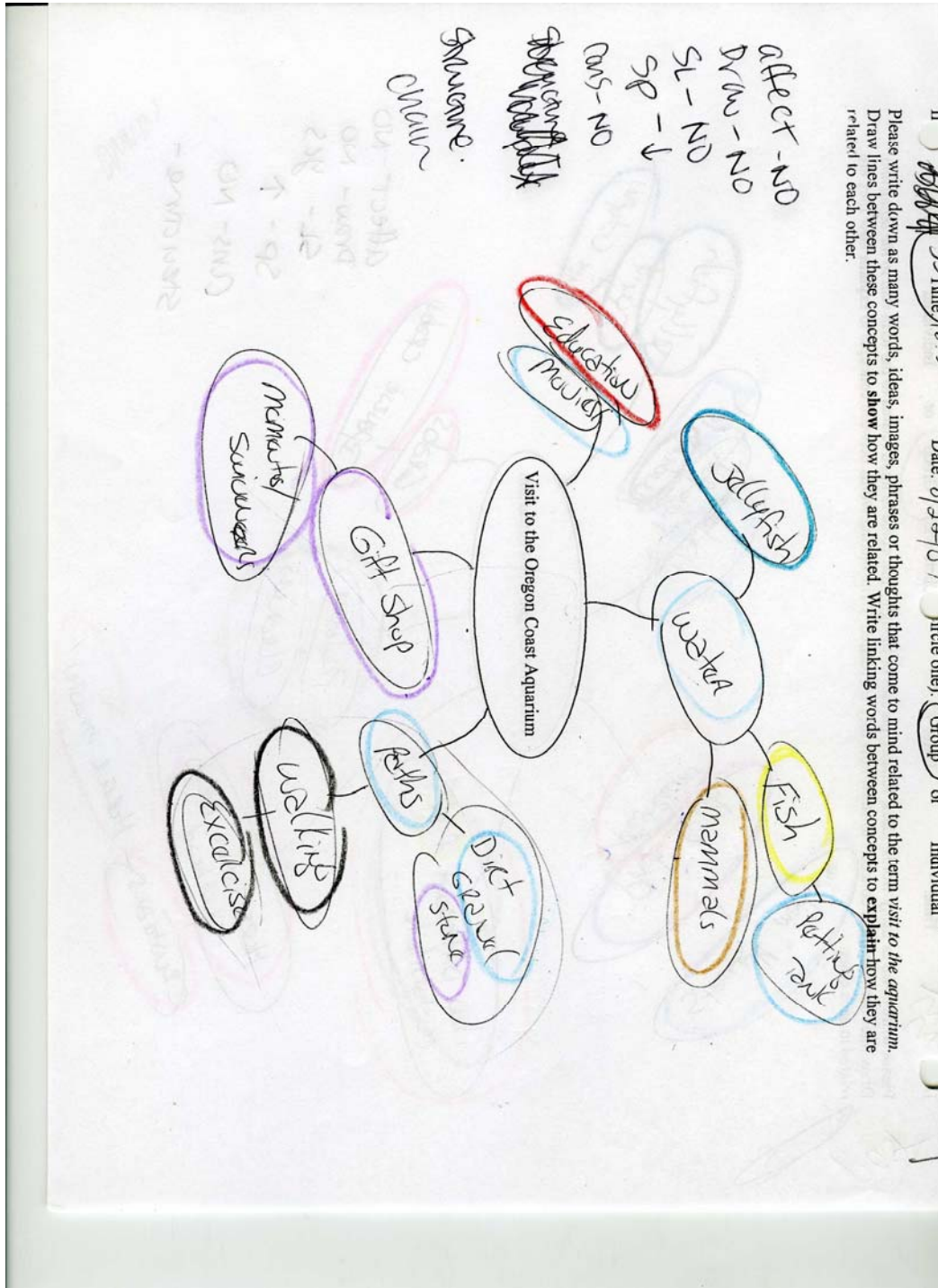
Appendix C2: Sample Map; post map visitor # 331
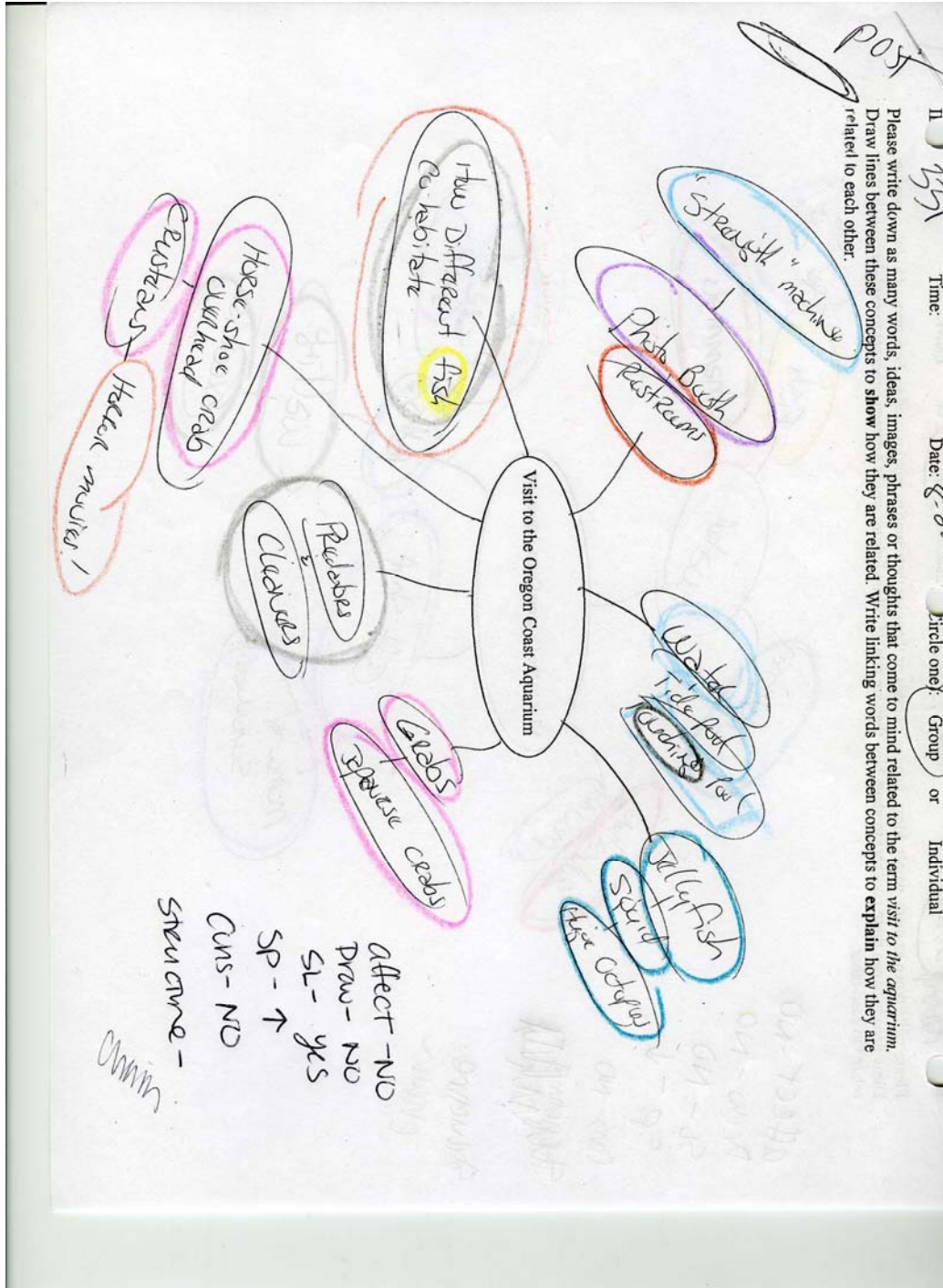
Appendix C3: Sample Map; pre map visitor # 346

Appendix C4: Sample Map; post map visitor # 346

Visit to the Oregon Coast Aquarium

POST

Please write down as many **words, ideas, images, phrases or thoughts** that come to mind related to the term *Visit to the Oregon Coast Aquarium*. Draw lines between these concepts to **show** how they are related. Write linking words between concepts to **explain** how they are related to each other.

affect (no)
Drawings (yes)
SC — NO
Cms. NO
saw more — Heaps