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"Timber for President": Adventure Learning and Motivation

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Adventure learning (AL) provides learners with opportunities to explore real-world issues through authentic learning experiences within collaborative online learning environments. This article reports on an AL program, designed using Keller's Attention, Relevance, Confidence, and Satisfaction (ACRS) motivational model of instructional design, which encompassed more than 3 million learners worldwide. The implementation of AL was examined through two experimental lenses: (a) how student motivation is related to student and teacher characteristics and (b) how student motivation is related to the ways in which the program was used within the classroom. Qualitative and quantitative measures were analyzed, including 21 teacher interviews and surveys of 228 respondents who used the online curriculum in 300 separate courses in grades K - 10 ranging from social studies to science to history courses.

The date is June 18th. The Arctic Transect team has landed at the Minneapolis-St. Paul International Airport after six months of crossing the Canadian Arctic by dogsled. Although schools have been dismissed for summer, hundreds of teachers and students, cameras in hand, flood the baggage claim area anxiously waiting to welcome the team home. Even though these individuals are strangers to one another, many whom travelled for hours from various cities throughout Minnesota and its neighboring states, a common strand holds them firmly together: all were involved with the adventure learning program, Arctic Transect. Standing near the entrances of the arrivals terminal, one young boy holds a sign that reads, "Timber for President" (Figure 1). Timber was the Polar Husky sled dog on the trail that "wrote" Timber tales, the bi-weekly update of what was happening in the field from the perspective of a dog, Timber.

Figure 1. Students who used the AL program wait to greet AT2004 team members at the airport; June 2004.

Arctic Transect: An Educational Exploration of Nunavut (AT) was an adventure learning program that connected more than 3,000,000 students and teachers around the world. In real-time, a team of educators and explorers traveled by dogsled from Yellowknife, Northwest Territories, Canada across Nunavut—the newest territory in the Canadian Arctic—to their final location at the north end of Baffin Island, Pond Inlet. Along the way, as the team dog sledded throughout this region they interacted with seven Inuit communities where they spent time collecting media artifacts (e.g., video, audio, photographs, interactive QuickTime Virtual Reality files), gathered data for

the weekly trail report that synched to the free 300 plus page K-12 curriculum, gathered traditional ecological knowledge on climate change, and collected environmental data for Environmental Canada. Meanwhile, students from the Arctic to California to Australia virtually participated in this 2,000 plus mile dog sled expedition through an online learning environment located at http://www.polarhusky.com/2004/ (Figure 2). Students were provided numerous opportunities to collaborate on learning activities within the AT online learning environment, which was designed around the curriculum and expedition, while also interacting directly with subject matter experts, native community members, as well as their own instructors. The program's K-12 multidisciplinary curriculum encompassed lessons ranging from social studies and science to physical education and language arts.

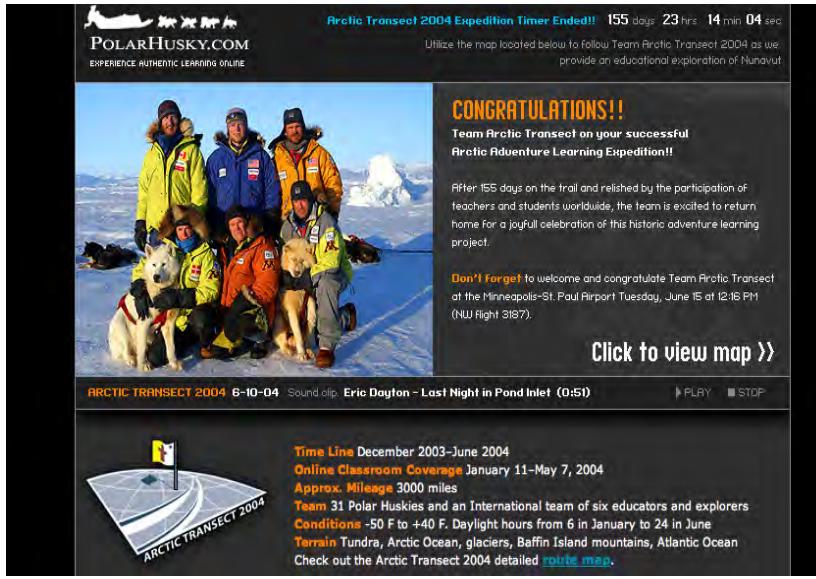

Figure 2. Welcome page of Arctic Transect website

This research describes how the AT adventure learning program was implemented into classrooms throughout the United States, how student motivation was related to student and teacher characteristics, and how student motivation was related to the ways in which the program was used within the classroom.

ADVENTURE LEARNING (AL): MOTIVATION THROUGH DISTANCE EDUCATION

In the following sections we present a brief historical overview of distance education and online learning; illustrate the theoretical background and principles of adventure learning design, development, and implementation; and discuss learner motivation in the context of interacting with an adventure learning online environment.

Distance Education

Notwithstanding various struggles to identify theories that guide online learning design, development, and implementation (Holmberg, 1995; Simonson, Smaldino, Albright, & Zvacek, 2003), general distance education programs are in abundance (Smith, Clark, & Blomeyer, 2005; Picciano & Seaman, 2007) with average increases in online enrollments ranging from 15% - 50% nationally. The progressive movement to online education is a result of many scholars noting that internet-based learning is the answer to the shortcomings of K-12 education (Watson, 2007). Despite the explosion in online learning, all-inclusive K-12 hybrid and online environments that are not school-based are rare (Doering, Hughes, & Scharber, 2007). All-inclusive online courses are curriculum and online learning environments where, depending on pedagogy, the online learning environment provides flexible individual lessons, lesson enhancements, and completely online courses and curriculum for teachers and students to use.

Adventure Learning

AL is a hybrid distance education approach that provides students with opportunities to explore real-world issues through authentic learning experiences within collaborative learning environments (Doering, 2006; Doering, 2007; Doering, Miller, & Veletsianos, 2008). AL is grounded in two theoretical perspectives of learning—experiential learning and inquiry-based learning (Doering, 2006). The synergy of these two learning theories infused into the design of AL environments leads to students learning from experiences and inquiry, which many believe to be the keys to authentic, meaningful learning (Dewey, 1938; Kolb,1984; Bransford, Brown, & Cocking, 1999; National Research Council, 1999; Rogers, 1969). There are seven principles that define the AL framework and are used accordingly to guide the design and development of AL programs used throughout the world (Doering, 2006). These seven principles and the educational, social, and technological affordances of AL environments have been explained in-depth (Doering, Miller & Veletsianos, 2008; Figure 3). An understanding of such affordances and relative artifacts enables teachers, teachers/designers, and

teachers/adventurers to design, implement, and research AL environments effectively. Recently, Doering, and Miller (2009) have taken the AL concept to the next level in what they refer to as AL 2.0—providing clear guidelines and directions on how to use the AL principles to design rich inquiry-based learning environments while developing community around content and places throughout the world.

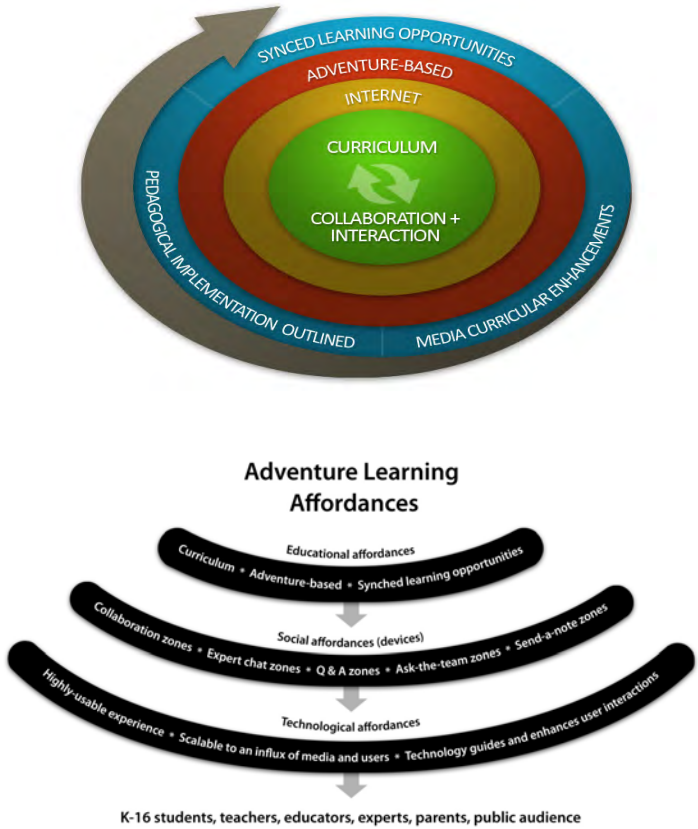

Figure 3. Principles and affordances of adventure learning

Arctic Transect Curriculum and Integration

On a more practical note, the AT AL program provided teachers with everything they needed to seamlessly integrate the program into their classrooms. The AT AL program was a holistic, multidisciplinary endeavor with both online and offline components. The offline curriculum and activity guide (CAAG) was developed to reflect the expedition's current Arctic locale (Nunavut) and indigenous culture (the Inuit). For each lesson, teachers were provided with content knowledge and pedagogical knowledge, assessment strategies, and a plethora of resources (see Appendix A for a description of the CAAG and http://www.polarhusky.com/support/get-curriculum/ for a unit example).

Aligned with national education standards, the CAAG was able to meet the diverse needs of learners in grades spanning K-12 through providing three levels of integration—"Experience, Explore, and Expand"—with specific lessons in each module that address grade levels K-5, 6-8, and 9-12 respectively. These integration levels ranged from a directed to an inquiry-based approach with specific scaffolding for learners embedded in each unit to accommodate diverse learning styles and special needs learners.

In tandem with the CAAG, the online environment encompassed comprehensive resources about the region of travel; collaborative opportunities between students, instructors, and team members; live field updates; and field research findings synched real-time to the curriculum (Doering, 2006). The online collaboration opportunities ranged from unit-specific collaboration zones to participation in expert chats and send-a-notes. For example, within a collaboration zone, students share, discuss, and debate curricular unit artifacts they have uploaded and posted to the learning environment centered around the unit's theme. Thus, if the unit was focused on climate change, student projects were related to their perspectives on climate change and their role in it as a member of society (for more examples of AL collaboration opportunities, see Doering, 2006; Doering, 2007; & Doering, & Veletsianos, 2008b).

Teachers were provided with a detailed calendar to help guide their integration of both on- and off-line program components (Appendix B). The curriculum was broken down into units that spanned a two-week period where the CAAG and components of the online classroom were aligned and focused on the topic of the current unit. So, how was this coordinated with the team on the trail?

Each week during the six-month expedition, team members took an "education day" and developed multimedia-enhanced reports transmitted by satellite to the online environment; these materials included items such as text-based trail updates, photographs, audio clips, video clips, and interac-

tive movies that provided timely information regarding expedition activities in relation to each unit's theme. In turn, students who accessed these materials interacted directly with expedition members through weekly team chat sessions, with academic experts through weekly expert chat sessions, and with one another through use of the collaboration zones. Consequently, AT strengthened the essential links between experience, inquiry, and learning among student participants by using the full capabilities of the Internet and multimedia technologies.

In regards to integration within the classroom, Doering and Veletsianos (2008a) sought to understand the pedagogical models teachers used to integrate an AL program in their classrooms, how students responded to the models, and how students' experiences were influenced by the integration model chosen by the teachers. Doering and Veletsianos (2008a) identified four integration models: (a) curriculum-based, (b) activities-based, (c) standards-based, and (d) media-based. These models detail how an AL program can be used in multi-faceted ways to meet the needs of learners and teachers based on the context of their classrooms. Pedagogical models ranged from teachers who supplanted their existing curriculum with the AL curriculum to those who used the AL program only for the collaborative activities or the media opportunities.

Motivation

Driven by the goal of increasing learner motivation and autonomy, Keller (1987, 1983, 1999) asserts that one of the most overlooked aspects of instructional design is designing for motivation. Thus, Keller developed the ARCS motivation model of instructional design (Keller, 1987). This model, which guided the development of the AT AL program, is comprised of attention (A), relevance (R), confidence (C), and satisfaction (S), each required to encourage student motivation when designing learning environments (Table 1). *Attention* is the ability to get the learner's attention, which can be achieved through sensory stimuli, inquiry arousal, and variability. *Relevance* is key to maintaining learner focus and dedication within the environment. It is the ability to have a learner be able to answer the question, "What's in it for me?" The benefits for the learner need to be clearly stated. *Confidence* refers to the learner's ability to achieve the predetermined goals in order that they continue to strive to other attainable goals. Finally, *satisfaction* occurs when the learner receives some reward or satisfaction from their learning experience, which may exist in the form of points, acknowledgement, and/or grades.

Table 1
Keller's Model Applied to Arctic Transect 2004's Curriculum and Online Learning Environment

Keller's ARCS Model	Question(s)	AL Element(s)	Modes
Attention	How do you get the learner's attention?	Adventure Arctic Dogs Extremes	Media – sound, photos, trail updates, qtvr
Relevance	What's in it for the learner?	Cultural Connections	Expert Chats Collaboration Zones Dogs Send-A-Note
Confidence	Can the learner achieve the objectives?	Content-Knowledge Digital Literacy Knowledge Self-Knowledge	Curriculum – Experience, Explore, Expand Scaffolding Activities Learning Flexibility
Satisfaction	What is the satisfaction or reward?	Meaningful Experiences Authentic Real-Time	AL Curriculum & Learning Environment

As noted in Table 1, the design of the AL program employed each phase of Keller's model. We strove to obtain the learner's *attention* by using the AL elements that would quickly "hook" learners on the program. We did this through the weekly trail reports that infused numerous media artifacts about the narrative of the adventure, the unknown of the Arctic, the excitement of the Polar Huskies, and the extremes of traveling in the Arctic weather.

Relevance was strived for by providing students with an understanding that AL is primarily about them. AL is about the many opportunities to collaborate with both their peers and experts from around the world to share who they are, how their research and studies can impact others around the world, and how through collaboration we can learn together. The AL elements that were designed to provide this relevance included the expert chats, collaboration zones, and the send-a-note features that allowed students to pose questions to the educators and explorers traveling throughout the Arctic.

The ability of students to become motivated is influenced by *confidence*—encouraging the achievement of AT's objectives. These objectives included acquiring content-knowledge through the design of the curriculum; digital literacy knowledge through the design of numerous media artifacts and technology-driven activities; and self-knowledge through collaboration with other cultures, reflection opportunities, and exposure to what may ap-

pear as unreal or be perceived as impossible (i.e., traveling throughout the Arctic by dogsled). Scaffolding of these learning objectives was provided for learners so they would incrementally increase their confidence.

Finally, the design of the environment was focused on learner *satisfaction*. The AL elements designed to encourage satisfaction included the wide-ranging potential for meaningful learning experiences with real-time authentic content. This content was provided in the K-12 curriculum through synched learning opportunities with numerous online learning features such as the trail reports, Timber Tales (i.e., the bi-weekly field update from the perspective of a dog, Timber), expert chats, and collaboration zones.

Researchers also stress the role of motivation in learning. Gagne and Driscoll (1999) posited the most important element in learner motivation is the desire to enter into the learning situation. Likewise, Krathwohl, Bloom, and Masia (1964) found that interest and motivation are principle indicators of cognitive engagement. Therefore, designers must examine the design of learning environments and their implementation to see *if* and *what* factors contribute to learner motivation. As researchers and designers, if we can identify and understand the factors that ultimately lead to learner motivation, there is great potential for the enhancement of future online learning environments.

PURPOSE

This study seeks to answer the following five questions:

- Who integrates adventure learning in the classroom?
- How is student motivation related to the student and teacher characteristics of those who used AL?
- How is student motivation related to AL pedagogy within the classroom?
- How do educators integrate AL within their classrooms?
- What are the strengths and weaknesses of the online learning environment (*The Online Classroom*)?

METHODS

This study employed mixed-methods; quantitative analysis of close-ended survey data and qualitative analysis of open-ended survey data as well as interview data. Educators who registered to use the AT AL program were asked to complete pre- and post-implementation surveys or a single, post-implementation survey. A sample of 109 users completed the pre-im-

plementation survey. Of these users, 41 completed a post-implementation survey, describing how they implemented AT in at least one course. A second sample of 339 registered users was recruited to respond to a single, post-implementation survey. Of these, 187 users responded and provided detailed information on how they implemented AT.

A common set of questions made up both post-implementation surveys from both sets of respondents (users who participated in the pre and post-survey and the postsurvey only). The post-implementation survey data are used in the survey analyses. The data set constructed from the two post-implementation surveys yielded 228 respondents in 300 separate courses. The survey data contained information about teachers who used AT in their classes (i.e., experience, skills, teaching philosophy), the setting in which they implemented the program (i.e., grade level, content of lessons, school characteristics, technology resources), and how they used AT in their courses (i.e., which features, how often, strengths and weaknesses as a learning tool).

The survey data were supplemented with telephone interviews with teachers who used the AL program. Of the 109 users who responded to the initial pre-implementation online survey, 21 users took part in a 15-minute telephone interview on their use and opinions of AT. This set of interviews included four special education teachers, one gifted education teacher, five elementary (K-5) teachers, seven junior high (6-8) teachers, one high school teacher (9-12), two teachers who taught a combination of grade levels, and one multi-district curriculum coordinator.

The qualitative survey data and phone interviews were analyzed using a constant comparative method (Glaser & Strauss, 1967) to develop the salient categories and patterns. First, authors compiled the data that pertained to each question/interview and developed an individual data set for each participant. Next, the data were read noting emerging patterns across individuals. The patterns were compiled and reread searching for confirming and disconfirming evidence. Finally, a consensus among the researchers on the salient patterns that emerged from the data was identified.

RESULTS

Student Motivation

The following analyses (Table 2) use the class as the unit of analysis (n=300). These analyses investigate how levels in the student motivation scale present in the surveys are related to student and teacher characteristics, as well as how the AL program was used in the classroom.

The post-implementation survey data revealed that 88% of the teachers at the "slightly agree" level or higher stated their students' academic motivation increased when using the AL program. Furthermore, 80% of the teachers at the "slightly agree" level or higher stated their students were motivated to learn about environmental issues—the core theme of the AL curriculum. Lastly, data portray that 80% of the teachers at the "slightly agree" level or higher stated their students were motivated to seek out more information in content area subjects after using the AL program.

Table 2
Analysis of Motivational Questions on Post-implementation Surveys

	Strongly Disagree	Dis-agree	Slightly Dis-agree	Slightly Agree	Agree	Strongly Agree	Number of Classes
Statement A	23.9%	36.0%	16.3%	15.2%	4.5%	4.2%	264
Statement B	3.4%	1.9%	6.4%	27.7%	37.1%	23.5%	264
Statement C	2.6%	11.3%	10.6%	24.5%	34.7%	16.2%	265
Statement D	3.0%	5.6%	10.9%	31.6%	31.6%	17.3%	266
Statement E	2.6%	5.3%	7.2%	27.2%	33.6%	24.2%	265
Statement F	3.4%	7.2%	9.5%	25.1%	35.0%	19.8%	263

Statement A: Things like the movies and the dogs were fun for kids to see but they rarely led to deeper learning in content area subjects.
Statement B: In general, my students' academic motivation increased when using Arctic Transect 2004 activities.
Statement C: In working with Arctic Transect 2004, many of my students used technology more and/or learned how to use new technology.
Statement D: My students were motivated to learn about environmental issues.
Statement E: My students developed an appreciation for the Inuit culture and people.
Statement F: The excitement of the Arctic Transect 2004 adventure motivated students to seek out more information in content area subjects.

Student Motivation and Classroom Activity

These data are useless unless we can identify what factors predict teacher-reported student motivation (Table 2). Thus, within this study, the dependent variable is a motivation scale made up of items B, D, E, and F with a Cronbach's alpha reliability equal to .88, a mean of 18, a standard deviation of 4, and a range between 4 and 24. As a result, students enrolled in grades K-6 rated significantly higher on the motivation scale with a mean of 18.4 versus 16.5 for classes with higher grade levels. Differences between course content areas were not observed.

To explore the relationship between student motivation, a factor analysis using maximum likelihood extraction was conducted on the six items. A single factor emerged accounting for 50% of the shared variance. Items B, D,

E, and F loaded highly on this factor (Appendix C). These items were then combined in a summary motivation scale (Cronbach's alpha reliability=.88). The scale had a range from 4 to 24, a mean of 18, and a standard deviation of 4. Students enrolled in grades K-6 scored significantly higher on the motivation scale (mean=18.4) than students in higher grade levels (mean=16.5).

Correlational analyses were performed between the motivation scale, individual motivation scale items, and teacher reports of how frequently their class undertook various online activities related to the program. For statistical reasons, the teacher is the unit of analysis and for teachers reporting on more than one class, only responses from the class having the strongest implementation were used. The results, shown in Table 3, reveal that the online activities that generally involved repeated access of the website to gain information about the expedition were the activities related to student motivation.

Table 3

Spearman's Rho Correlations Between Motivation and Use of the AL program, AT2004 (Post-implementation Surveys)

Which of the following did you and your students do in this class as part of your work with polarhuksy.com? 1=Did not do 2=Did 1-2 times 3=Did 3-4 times 4=More than 4 times	**Academic Motivation Statements** (1=Strongly Disagree, 6=Strongly Agree)				
	Item B	**Item D**	**Item E**	**Item F**	*Scale*
1. Participated in an online chat	-.01	-.01	-.05	.09	.03
2. Posted something in one of the website zones	.03	.10	.06	.10	.12
3. Read about the environment	.13	** .32	** .27	** .31	** .34
4. Read about the Inuit	** .33	** .32	** .56	** .38	** .50
5. Read about the dogs	** .31	** .18	** .26	** .30	** .34
6. Accessed videos and audios	** .24	* .16	** .20	* .18	** .25
7. Used activity from the curriculum guide	** .22	** .32	** .32	** .25	** .35
8. Read weekly updates (trail reports)	** .29	** .27	** .36	** .28	** .37
9. Looked at the photo journal	** .33	** .27	** .30	** .26	** .37
10. Took a quiz about the expedition	.01	.10	.00	-.02	.05
11. Raised money for the expedition	* .16	.07	* .16	.11	* .16
12. Used GIS	.04	.14	.11	.04	.10

* $p < .05$, ** $p < .01$

Item B. In general, my students' academic motivation increased when using Arctic Transect 2004 activities.
Item D. My students were motivated to learn about environmental issues.
Item E. My students developed an appreciation for the Inuit culture and people.
Item F. The excitement of the Arctic Transect 2004 adventure motivated students to seek out more information in content area subjects.

n = 193 - 204

A factor analysis using maximum likelihood extraction revealed that items #3 through #9 loaded on a single factor accounting for 32% of the shared variance and these items were combined in an additive scale (Cronbach's alpha=.87) of the AL activities (Appendix C). A correlational analysis was then performed between the student motivation scale, the AL activity, and other school, classroom, and teacher-level measures contained in the survey. The results of the factor analysis revealed that school-level (i.e., type of school, student poverty, technology resources) characteristics were not related to the level of activity or student motivation, nor were some teacher-level characteristics such as experience or technological skill. However, teachers who reported a more constructivist teaching philosophy, as measured by a scale (Ravitz, Becker, & Wong, 2000), used AL more intensely in their courses and reported higher student motivation as compared to teachers with a more traditional teaching philosophy. In addition, the presence of another teacher in the school using AL was positively related to the level of AL activity and student motivation. Not surprisingly, the number of courses where a teacher used AL was related to the level of activity in a given course, although this did not appear to influence student motivation. Finally, elementary students appeared more responsive to the use of AL than other students, although elementary teachers did not necessarily use the website to a greater degree in their courses than other teachers.

To explicate the causal relationship among the use of AL, student motivation, and teaching style, a structural equation model was constructed linking these three constructs. Grade level is also included so that the model is not under identified, though it does not prove to be a significant predictor. The full model is shown in Figure 4. Each theoretical construct is represented by a circle while each observable measure is represented by a rectangle (see Appendix D for individual measure loadings on constructs). The model shows a statistically significant negative path from traditional teaching style to class activities, suggesting those teachers reporting a more traditional style implemented AL less often than those teachers with a more constructivist teaching style. There is also a strong statistically significant path from class activities to student motivation. By contrast, there is not a statistically significant path from teaching style to student academic motivation. Overall, the model suggests that constructivist teachers influence students' motivation in relation to AL purely through how strongly they implement the environment in their course.

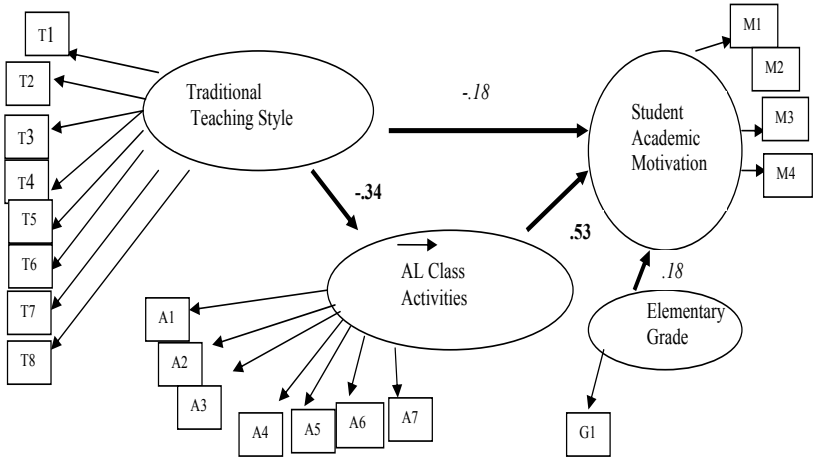

Figure 4. Structural equation model of teaching style, AL class activities, and student motivation.
Note. Numbers are standardized path coefficients between latent constructs. Numbers in bold are statistically significant ($p < .05$). RMSEA = .016, Chi-square=156.32, p=. 30.

Figure 4 Key

Teaching Style (1=Strongly Disagree, 2=Disagree, 3=Neutral, 4=Agree, 5=Strongly Agree)
T1 Students are not ready for "meaningful" learning until they have acquired basic reading and math skills.
T2 It is better when the teacher—not the students—decides what activities are to be done.
T3 Instruction should be built around problems with clear, correct answers, and around ideas that most students can grasp quickly.
T4 How much students learn depends on how much background knowledge they have—that is why teaching facts is so necessary.
T5 Student projects often result in students learning all sorts of wrong "knowledge".
T6 Homework is a good setting for having students answer questions posed in their textbooks.
T7 Students will take more initiative to learn when they feel free to move around the room during class.
T8 Students should help establish criteria on which their work will be assessed.
Classroom Motivation (1=Strongly Disagree, 2=Disagree, 3=Neutral, 4=Agree, 5=Strongly Agree)
M1 In general, my students' academic motivation increased when using Arctic Transect 2004 activities.
M2 My students were motivated to learn about environmental issues.
M3 My students developed an appreciation for the Inuit culture and people.
M4 The excitement of the Arctic Transect 2004 adventure motivated students to seek out more information in content area subjects.

Classroom Activity (1=Did not do, 2=Did 1-2 times, 3=Did 3-4 times, 4=Did more than 4 times)
A1 Read about the environment
A2 Read about the Inuit
A3 Read about the dogs
A4 Accessed videos and audios
A5 Used activity from the curriculum guide
A6 Read weekly updates (trail reports)
A7 Looked at the photo journal
Grade Level
G1 Taught in K-6 grades. (1=Yes, 0=No)

INTEGRATION, STRENGTHS, AND WEAKNESSES OF ADVENTURE LEARNING

Qualitative Analysis

The qualitative survey data and phone interviews were analyzed using a constant comparative method (Glaser & Strauss, 1967) to develop the salient categories and patterns. First, authors compiled the data that pertained to each question/interview and developed an individual data set for each participant. Next, the data were read noting patterns across individuals. The patterns were compiled and reread searching for confirming and disconfirming evidence. Finally, a consensus on the salient patterns that were found in the data was agreed upon.

Integration Overview

The AL project had a special appeal and applicability to elementary classrooms. Over two-thirds of the classrooms that taught the AL curriculum were at the sixth grade level or below and less than 10% were at the secondary level. When describing the content of the course, social studies accounted for over one-third of the courses (34.9%), followed by general elementary curriculum (25.7%), and science (18.2%). A significant minority (8.2%) were special education classrooms.

The two main sources for initially learning about the AL program were online sources (e.g., the National Geographic website) and personal contact from a friend or project member. Both sources were cited by approximately one-third of respondents.

When interviewed and surveyed teachers were asked about how the AL project was used in their course(s), the majority of teachers either used it as an enrichment opportunity for students (47.3% of classes) or a supplement to current course material (37.0% of classes). Only 6% of classes for which

teachers reported using the AL project used it as a replacement for their current curriculum. Interviews with teachers revealed that the primary reason for low-level integration was not a lack of material to apply to their courses within the website or curriculum guide, but rather a need to cover other prescribed curriculum. Interestingly, despite the periphery nature of the Arctic Transect curriculum in most classrooms, the majority of teachers reported using it at minimum once or twice per week (56.7% of classes).

Teachers were also asked about the specific features of the online environment they used in their courses. The feature most frequently cited was *reading about the Polar Husky sled dogs* with 96.3% of teachers reporting that they and nearly two-thirds of their classes did this four or more times per week. Students following along with the adventure through other features of the online environment were also popular. These activities included *reading the weekly updates, looking at the photo journal*, and *accessing video and audio media*—with at least 48.5% of the classes reporting doing each four or more times per week. Activities such *as reading about the environment and the Inuit* and *using the curriculum guide* were also frequently undertaken. Other aspects that proved attractive were the focus on the dogs and the real-time nature of the expedition.

Strengths of AL Within the Classroom

Exceptional classrooms excelled with AL. AL was used in a variety of ways in classrooms, depending on the age and academic level of the students, the technical circumstances in the classroom, and the desired outcomes set by the teacher. Student motivation was mentioned 40% of the time in interviews conducted with teachers of exceptional classrooms. These classrooms included gifted and talented, learning and emotionally disabled, and classrooms where students were teenage mothers or fathers.

Gifted and talented teachers reported their students would read the entire trail report and interact with the daily and weekly updates. Teachers would use all levels of the curriculum, but would use the "Explore" (advanced) level most often. Katie, a gifted and talented teacher, used the program as "an online learning curriculum replacement." She noted that the learning environment and curriculum provided "so many learning opportunities that each student found an area to explore and engage in." Another gifted and talented teacher, Susan, connected the AL project to a series of lessons. For example, her students completed a research project on a specific dog, they experimented with the density and melting point of snow, studied the Inuit flag, and then designed their own family flag (all the flags were later made into one large quilt). Susan said, "[The curriculum] would provide enrichment and a challenge for the type of students that I serve, which

are the gifted population of kids, and it was enriching enough that it would hook them."

Both learning disabled students and students with challenging outside-of-school situations also valued the learning environment. Special education teachers commented that their students enjoyed listening to the trail report media and looking at the Arctic photos. When referring to the online learning environment, Martha said, "We could use it all, pretty much every part of our day." The multimedia aspects of the online classroom made it particularly attractive to special education students with early literacy skills. Brad, a high school teacher commented, "We have teen moms and teen dads… with kids that are sick and so, you can't really have a group that you can take through an experience such as this. Our group only comes sporadically. We appear to run into this with everything we do. But in this case, this is an adventure, and they started and they are progressing, and you are not even there with them."

Student motivation is driven through connections with facets of the online learning environment. Although one might find it peculiar, the most common theme occurring in more than 90% of the responses were comments related to the Polar Husky sled dogs. Nancy commented:

> Anything about the dogs. That was a really good idea to get the little ones interested. For the little ones, the dogs are like people to them. So you know, they are as equally interested in what's going on with the dogs as they with what's going on with the team and they were really excited about uploading pictures of their dogs to that Dog Zone area. They thought that was really exciting. They have certain dogs that they follow. They try to pick their dog out, you know, if there are any QuickTime movies or anything, they try and pick out their dog from the group.

Indeed, more than 80% of the teachers described how the dogs were the common strand students would discuss *outside* of the classroom. Students would consistently refer to a favorite dog and they wondered what their favorite dogs were doing on the trail. The dogs were easy for the students to love and be motivated to seek out on the site as they "know dogs and can relate to them." Another teacher, Susan, described her students' reactions to Timber Tales, a daily update from the educators on the trail from the perspective of one of the dogs, Timber. "They especially loved the Timber Tales…I asked them in getting ready to talk with you [the interviewer], 'is there anything that you'd like me to tell them that maybe you would like more or less of or something different?' The students said 'more Timber

Tales!'" The connections students had with the dogs were real and proved valuable to motivate students to enter *The Online Classroom*.

Authentic connections provided motivation for inquiry. The multiple media that were available by way of *The Online Classroom* motivated students because of the relationship to authentic real-world content. Over 90% of teachers made some comment related to the authentic nature of the content. Mike commented:

> With [the students] actually being able to see real people and you know, from the web movies, and see them on the chats, the students loved it as they said: "It must be real. Somebody's actually talking on the computer."

Jill also resonated Mike's comments about the student motivation because of the authentic material. Jill commented:

> The recorded reports that we get to listen to, the movies with the sound, all those kinds of media showing real-world things have really held their interest. And that's saying a lot for my kids. It's really hard to get them to come out of their shells and give them some outside thing. When I say it's time to check in on the new report, they're all ready to go. They're all watching the computer and they're all ready to listen. They're very excited about it. And that's very different from the other projects that I've tried in the past.

Weaknesses of AL within the Classroom

Technology and access issues. When the AL program could not be integrated at a level teachers wanted, they most often cited technology access and technological problems. Fifty percent (50%) of the teachers described a struggle to obtain access to the computer labs, problems downloading software, and basic "server problems." To remedy this problem, teachers would have students work in pairs when computers were limited, would project the computer on a screen in front of the classroom, and would print parts of the website to share with their students.

Overwhelming curriculum and standards and No Child Left Behind (NCLB). The comprehensive curriculum with the multiple levels of implementation was noted as both a strength and a weakness. Even with pedagogical guidelines the curriculum overwhelmed teachers. The district curriculum specialist and five teachers described the magnitude of the curriculum and how it was "overwhelming" at times. They struggled to see how they

could integrate it to the fullest, and still meet the state and federal standards requirements. Teachers stated that they "enthusiastically integrated" the curriculum until "testing time," referring to the state standards and the requirements brought about by the NCLB.

DISCUSSION

AL using Keller's ARCS motivational model of instructional design shows promise in increasing student motivation. As Hastings and Tracey (2005) encouraged us to question the current state of the cross-media comparison studies and Whittington (1987) stressed the importance of looking at pedagogy, this study reveals the significant relationship between constructivist pedagogy and the design of AL, which, in turn, significantly impacted student academic motivation. As noted in Table 4 and the results, the design of the AL program did influence students' motivation through attention, relevance, confidence, and satisfaction.

K-6 teachers, teachers of exceptional students such as gifted and talented or learning disabled, and teachers who used a "constructivist" pedagogy integrated the AL program most frequently. Integration of AT occurred primarily through enrichment activities or as a supplement to course materials with only 6% stating they used it as a curriculum replacement. Frequent integrators stated that AT aligned well with their curriculum, they had frequent access to the Internet, and they were enthusiastic about modifying the curriculum to meet the needs of their existing curricula and students. Teachers most frequently integrated the curriculum because they felt it motivated their students and they believed the inquiry approach to learning was best for their students. Teachers also felt the project "invigorated" them to try new approaches in their classroom and that this self-motivation was shared throughout the class as their students learned about cultures in a new interactive approach.

The multimedia features of the website were most frequently visited as they provided an interactive, real-time experience for the students. Teachers praised the problem-based curriculum as they viewed it as a positive approach to learning, especially as it is reinforced with real-world experiences. Weaknesses of the program were related to environmental contexts such as time to consider alternative integration approaches, access to technology within their schools, and requirements to meet the NCLB standards within their district.

Table 4
Keller's ARCS Model and the Relationship to Adventure Learning and the Study's Findings

Keller's ARCS Model	Question(s)	AL Element(s)	Modes	Findings
Attention	How do you get the learner's attention?	Adventure Arctic Dogs Extremes	Media – sound, photos, trail updates, qtvr	Students were motivated to learn about the Arctic, the Polar Huskies, read about the real-time authentic narrative of traveling throughout the Arctic, and use the numerous media artifacts.
Relevance	What's in it for the learner?	Cultural Connections	Expert Chats Collaboration Zones Dogs Send-A-Note	Students were motivated by and felt a connection with the Polar Huskies, fellow students throughout the world, with the Arctic Transect team and experts within the "expert chats."
Confidence	Can the learner achieve the objectives?	Content-Knowledge Digital Literacy Knowledge Self-Knowledge	Curriculum – Experience, Explore, Expand Scaffolding Activities Learning Flexibility	Through the design of the curriculum and the online learning environment, students were able to successfully participate in both the curriculum and the online learning environment.
Satisfaction	What is the satisfaction or reward?	Meaningful Experiences Authentic Real-Time	AL Curriculum & Learning Environment	Students felt a connection to the Polar Huskies, the Arctic, the Arctic Transect team, and fellow learners as they used the curriculum and online learning environment.

Exploring Forward in AL Research and Design

As researchers and designers of online learning, we believe one of the most intriguing findings of this inquiry is the motivational "hook" that both

teachers and students experienced with the sled dogs. As noted by one of our teacher participants, the dogs became the "common strand" between the explorers, the teachers, the online learning environment, and the students themselves. Whether enrolled in gifted and talented, learning and/or emotionally disabled, traditional, or nontraditional programs, the dogs served as an entry point into the AL online learning environment for the majority of AT students. Teacher participants in this research frequently noted that students would often log onto the online environment to find out what "their dog" had been up to on the trail, ultimately becoming motivated to further explore the various activities, expedition data, multimedia artifacts, and collaborative opportunities within the AT environment. In turn, through virtual connections formed between the students and polar huskies, the AL program began to leave a lasting impression on the learners, becoming part of each learner's self-narrative as they awaited and hoped for additional news on their favorite dog(s). These impacts of the dogs on learner motivation are defined by recent research as *transformative learning experiences* (Wilson, Switzer, Parrish, & The IDEAL Research Lab, 2006), ones we hope the learners carry with them for many years.

While we are not suggesting that dogs (or any animals, for that matter) should be incorporated into the design and research of future online learning environments, we encourage educators, designers, and researchers to seek out those potential "hooks" within their respective domains that may encourage student motivation and pull students further into the environment and inherent educational activities. By creating and seeding opportunities for these types of learner experiences, we, as a field, may find ourselves on the forefront of contemporary research into the emotional design facets for online learning (Hokanson & Miller, 2009).

Looking back over the 2000 plus Arctic miles travelled, the frequent and unimaginable -40 degree Fahrenheit nights, the wonderful connections we formed with numerous Inuit communities and elders, and the more than 3 million students and educators who interacted with and collaborated within the AT online environment, we believe our primary goal has been achieved: to provide a unique and truly meaningful learning experience for students around the world. As educational explorers, we rely on our team members, our dogs, our gear, and collected data and research on our region of travel to be successful. However, we also rely upon our innate intuitions and motivations to continue forward. Similarly, as designers we rely on volumes of empirical research, centuries of learning theories, and an array of proven pedagogical strategies when designing learning environments, whether they exist as online, hybrid, or solely classroom-based initiatives. Nevertheless, we must remember that we are designing *experiences* that afford effective pedagogical implementation—not the other way around. As illustrated in

this study, motivation can be a powerful component in the nature of experiences teachers and students construct through online learning. We believe further examination of adventure learning through design, implementation, and inquiry will continue to provide learners with motivating, meaningful, and transformative learning experiences for decades to come.

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Appendix A: Arctic Transect Adventure Learning Program Curriculum and Activity Guide Overview

Explaining the Curriculum & Activity Guide

Cover page. This page simply identifies the unit and its title. For example, the second unit is called, "Planning an Expedition". An Inuit phrase is written in syllabics and then written in English as well. *NOTE: Each unit is designed to be used for one week. The curriculum, online chat, questions for the team and trail reports all complement the weekly unit theme.*

Outline and Overview. This page is designed to give you a simple overview of the unit and its contents. A unit summary gives a brief overview and a list of four concepts – these are the concepts that are addressed and focused on throughout the activities in the unit. A table of contents also appears on this page. Each activity is listed (in order) by number, level and title. In the left-hand column of this page, find the corresponding trail report, skills used in activities and national learning standards that are addressed.

Background Information. Do not skip these pages! Please take a few moments to read them. The purpose of the background information is to provide educators with the knowledge (Inuit and general) they will need to feel confident in working with the content of the activities contained in the unit. No further research should be necessary.

Topics. Each unit is divided into two main themes: activities that focus on Inuit culture and traditions and activities that have a more general focus. For example, in Unit Two, the first activity section is entitled, "Natives and Europeans". There are three activities in this section (one for each learner level), and all of them focus on the traditional seasonal lifestyle of the Inuit. The next section is entitled, "Decision Making". Again, it contains three activities (one Experience, one Explore, and one Expand), but these activities have a more general focus.

Activities. Each activity is numbered for easy identification and accessibility. For example, the first activity in Unit Two is numbered "2-1" and is an Experience (K-3) activity. The second activity is numbered "2-2" and is an Explore (4-8) activity. The third activity is numbered "2-3" and, you guessed it, is an Expand (9-12) activity. The first activity in the section, "Decision Making", is numbered 2-4 (Explore). Activities all contain easily referred to learner level, subject areas, objectives, time consideration, materials, vocabulary assessments and additional resources.

Extensions. Just in case you do not find an activity that complements your classroom agenda or focus, or if you want a source of additional activity ideas, simply consult "Extensions". You will find nine activity ideas listed on this page – three Experience, three Explore and three Expand! Using the ideas on this page, you can easily develop quality activities that are tailored to your individual classroom needs. This page is also an excellent resource to use for designing individual student projects!

The Science of... All units have a science activity that is located directly after the Extensions page. Each science activity relates to the unit topic. For example, in Unit Two, "Planning an Expedition," students investigate *The Science of Exploration*. The format of the science activities is identical to all the other activities, with the exception of a science quotation that appears at the top of each science activity. NOTE: Be sure to check the activity level of the science activities. Some science activities are geared for use with all learner levels, while others are designed with the Explore or Expand level in mind.

Online Chat. Each week, students are able to participate in an online chat about topics that revolve around contemporary, interesting and important issues in the world today – each complementing the theme of each unit. For example, Unit Two's chat topic is *Exploration*. The students are presented with relevant background information on the history of exploration, as well as three thought-provoking questions. Students are then able to add their comments to the "discussion boards" found in the Online Classroom at PolarHusky.com. If computer access is limited, the chat can also take place off-line through a discussion within your individual classroom, using printed transcripts. See the chat section of the expedition website for more details.

Questions for the Team. Students always have questions for the team members regarding their experiences and their way of life on the trail. So, this section was developed in order to give students the opportunity to ask their questions...and get them answered! Use this simple and reproducible worksheet to draft questions for the team before sitting down at the computer. Give to individual students or complete as a group. Again, each "Questions for the Team" section corresponds to the unit's focus. See the Online Classroom for more details.

Student Pages. Student Pages are reproducible worksheets that compliment a specific activity. If an activity uses a Student Page, it will be listed under the "Materials" section. Specific pages will also be referenced in the "Procedure", so no confusion should occur. The Student Pages appear in order of activity, so everything that is needed for activity 2-1 is first, items for activity 2-2 appear next, etc.

Teacher Notes. If any extra information or instructions are required to complete a specific activity, they are included in a Teacher Notes Page. These pages are found with corresponding Student Pages at the end of each unit.

References and Resources. All of the resources consulted for the development of the activities and information in the background section are listed on the last page of each unit.

Appendix B: Arctic Transect Adventure Learning Program Calendar

Calendar

	Sun	Mon	Tue	Wed	Thu	Fri	Sat
JANUARY	11	12	13	14	15	16	17
		Unit 1: Building Nunavut					
		Trail Report week 1			Unit 1 Quiz	Online chat	
	18	19	20	21	22	23	24
		Unit 2: Planning an Expedition					
		Trail Report week 2			Online chat Unit 2 Quiz		
	25	26	27	28	29	30	31
		Unit 3: People and Culture					
		Trail Report week 3		Online chat	Unit 3 Quiz		
FEBRUARY	1	2	3	4	5	6	7
		Unit 4: Traveling on the Land					
		Trail Report week 4			Online chat		
	8	9	10	11	12	13	14
		Unit 4: Traveling on the Land					
		Trail Report week 5	Online chat		Unit 4 Quiz		
	15	16	17	18	19	20	21
		Unit 5: Nature in the Subarctic					
		Trail Report week 6				Online chat	
	22	23	24	25	26	27	28
		Unit 5: Nature in the Subarctic					
		Trail Report week 7		Online chat	Unit 5 Quiz		
	29	1	2	3	4	5	6

Appendix C: Principal Components Analysis of Survey Items

Table A.1

Factor Loadings on Classroom Motivation Items. *N*=199.

	Loading
a. Things like the movies and the dogs were fun for kids to see but they rarely led to deeper learning in content area subjects.	-.413
b. In general, my students' academic motivation increased when using Arctic Transect 2004 activities.	.794
c. In working with Arctic Transect 2004, many of my students used technology more and/or learned how to use new technology.	.590
d. My students were motivated to learn about environmental issues.	.770
e. My students developed an appreciation for the Inuit culture and people.	.745
f. The excitement of the Arctic Transect 2004 adventure motivated students to seek out more information in content area subjects.	.839

Table A.2

Factor Loadings for Classroom Activity Items. *N*=204.

	Factor		
	1	2	3
a. Participated in an online chat	.214	.317	-.150
b. Posted something in one of the website zones	.288	.149	.164
c. Read about the environment	.708	.247	.103
d. Read about the Inuit	.743	.284	.110
e. Read about the dogs	.718	.061	.154
f. Accessed videos and audios	.614	-.140	.104
g. Used activity from the curriculum guide	.549	.330	-.178
h. Read weekly updates (trail reports)	.785	-.216	-.125
i. Looked at the photo journal	.846	-.272	-.033
j. Took a quiz about the expedition	.346	.313	-.310
k.Raised money for the expedition	.090	.112	.330
l. Used GIS	.182	.211	-.158

Appendix D: Structural Equation Model Construct Loadings on Individual Measures

Construct	Indicator	Loading (Standard Error)
Traditional Teaching Style	T1 Students are not ready for "meaningful" learning until they have acquired basic reading and math skills.	1.00
	T2 It is better when the teacher - not the students - decides what activities are to be done.	1.13 (.02)
	T3 Instruction should be built around problems with clear, correct answers, and around ideas that most students can grasp quickly.	0.93 (.18)
	T4 How much students learn depends on how much background knowledge they have - that is why teaching facts is so necessary.	1.16 (.21)
	T5 Student projects often result in students learning all sorts of wrong "knowledge".	0.46 (.11)
	T6 Homework is a good setting for having students answer questions posed in their textbooks.	0.72 (.17)
	T7 Students will take more initiative to learn when they feel free to move around the room during class. (reverse coded)	0.48 (.16)
	T8 tudents should help establish criteria on which their work will be assessed. (reverse coded)	0.43 (.15)
Polarhusky Activities	A1 Read about the environment	1.00
	A2 Read about the Inuit	1.12 (.10)
	A3 Read about the dogs	0.95 (.10)
	A4 Accessed videos and audios	0.97 (.12)
	A5 Used activity from the curriculum guide	0.97 (.13)
	A6 Read weekly updates (trail reports)	1.03 (.11)
	A7 Looked at the photo journal	1.05 (.11)

Student Academic Motivation	M1 In general, my students' academic motivation increased when using Arctic Transect 2004 activities.	1.00
	M2 My students were motivated to learn about environmental issues.	1.00 (.09)
	M3 My students developed an appreciation for the Inuit culture and people.	0.95 (.08)
	M4 The excitement of the Arctic Transect 2004 adventure motivated students to seek out more information in content area subjects.	1.21 (.10)