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# A Review of Adventure Learning

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Résumé de l'article

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# *A Review of Adventure Learning*

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## Abstract

Adventure learning (AL) is an approach for the design of digitally-enhanced teaching and learning environments driven by a framework of guidelines grounded on experiential and inquiry-based education. The purpose of this paper is to review the adventure learning literature and to describe the status quo of the practice by identifying the current knowledge, misconceptions, and future opportunities in adventure learning. Specifically, the authors present an integrative analysis of the adventure learning literature, identify knowledge gaps, present future research directions, and discuss research methods and approaches that may improve the AL approach.

The authors engaged in a systematic search strategy to identify adventure learning studies then applied a set of criteria to decide whether to include or exclude each study. Results from the systematic review were combined, analyzed, and critiqued inductively using the constant comparative method and weaved together using the qualitative metasynthesis approach.

Results indicate the appeal and promise of the adventure learning approach. Nevertheless, the authors recommend further investigation of the approach. Along with studies that investigate learning outcomes, aspects of the AL approach that are engaging, and the nature of expert-learner collaboration, future adventure learning projects that focus on higher education and are (a) small and (b) diverse can yield significant knowledge into adventure learning. Research and design in this area will benefit by taking an activity theory and design-based research perspective.

## Background to the Study

Researchers and practitioners have often sought to engage learners in authentic and experiential learning in an attempt to connect the activities that occur in the classroom with learners' lives beyond the classroom walls. Herrington, Oliver, and Reeves (2006) argue that successful distance education depends on relevant and authentic tasks. One creative and promising way to engage learners in such activities, therefore, has been through the development of educational programs

that revolve around expeditions and adventures grounded on the use of technology to reinforce the experience and connect learners, educators, and experts (Buettner & Mason, 1996; Buettner, 1997).

Given the potentially powerful and lasting impact that such programs have exhibited (Hattie et al., 1997), the interest from the educational community (Schutz, 2008), and the relative confusion that exists in the current literature with regards to how powerful outcomes are achieved in adventure-based education (Hattie et al., 1997; McKenzie, 2000), this paper presents the current knowledge and gaps in our understanding of the *adventure learning approach* to designing technology-enhanced educational experiences. Our goal is to examine the research on adventure learning so as to delineate findings and recommendations for future research.

We begin by explaining adventure learning and contrasting it to different forms of adventure-based expeditions. Next, we present our method of inquiry and analysis and delve into a discussion of (a) what is currently known and (b) what is not known about this topic. We then discuss future research approaches for adventure learning and conclude with our vision for the future use and implementation of this approach.

## Adventure Learning

Numerous online learning programs focus on adventure and outdoors expeditions. Examples include GoNorth! (http://www.polarhusky.com/), the Jason Project (http://www.jason.org), The World of Wonders (http://www.questconnect.org/world_of_wonders.htm), Blue Zones (http://www.bluezones.com/education), Expedschools (http://www.expedschools.org/), and eField Trips (http://www.efieldtrips.org/). A complicating factor in our discussion of such endeavors is the terminology used to describe them as the literature includes references to adventure learning (Doering, 2006), virtual/electronic field trips (Jacobson, Militello, & Baveye, 2009), adventure-education (Hattie et al., 1997), outdoor education (Rickinson et al., 2004), and online expeditions (Rasmussen & Northrup, 1999). While these approaches have adventure as a central theme, their similarities and differences vary greatly. For instance, some of these activities are projects (e.g., Expedschools) as opposed to models of educational design (e.g., adventure learning). Furthermore, some approaches may involve only virtual projects (e.g., eField Trips), only outdoors activities (Rickinson et al., 2004), or a combination of the two (e.g., GoNorth!). The extent to which these projects/activities are grounded on theory and empirical research is an important distinguishing factor. Due to these differences, in this paper we focus on reviewing the adventure learning approach because, to the best of our knowledge, it is the only one that is grounded on theory, practice, and research with continuous development and refinement.

Adventure learning (AL) is defined as an approach to the design of online and hybrid education that provides students with opportunities to explore real-world issues through authentic learning experiences within collaborative learning environments (Doering 2006, 2007). Jonassen (1991) defined authentic activities as appropriately complex tasks with real-world relevance and utility. Importantly, Jonassen further argues that such tasks should also allow learner flexibility in terms of difficulty and involvement. The approach is based on the theoretical foundations of

experiential (Kolb, 1984) and inquiry-based (Dewey, 1938) learning. More specifically, the approach assumes that students learn by immersing themselves in participatory experiences grounded in inquiry.

To date, five educational interventions have been based on the adventure learning approach: Arctic Transect 2004 and GoNorth! 2006-2009. These projects have been based on the same narrative: Each year a team of explorers and educators traverses an Arctic region of the world on a dog-sledding expedition, engaging teachers, students, and parents from around the world in a distance learning adventure. The expeditions are based on freely available problem- and inquiry-based curricula that focus on a specific issue, a region of travel, and the local people, and are enhanced by electronic media sent from the trail (e.g., video, audio, imagery). These artifacts are available in an online learning environment that documents the adventure while enhancing the curriculum (Doering, 2007).

Participants engage in the experience via numerous mediating artifacts, including weekly trail reports that present the expedition and adventure, a dog blog that presents the expedition through the eyes of one of the participating dogs, and collaboration zones where participants can interact in real-time and asynchronously with experts and each other. Other features of the learning environment include web-based video games relating to the curriculum, opportunities for learners to send virtual notes to the explorers, and an opportunity for one teacher per year to participate in the expedition as an explorer. Such practices are referred to as *situative* and *participation-oriented* (Greeno, 1998), where the focus is on the systems and activities through which learners interact with others. Scardamalia and Berieter (in press) capture the development of this environment in their description of 'learning communities' as communities where knowledge is shared, socially constructed, and collaboratively supported.

# Method

A structured and systematic methodology was used to review and analyze the adventure learning literature. We first engaged in a systematic search strategy to identify relevant studies. Once such studies were located, we applied a set of criteria to decide whether to include or exclude each individual study. The results from the systematic review were combined, analyzed, and critiqued inductively using the constant comparative method and weaved together using the qualitative metasynthesis approach. Each of these steps is described in detail below.

## Search Strategy

To retrieve the papers informing this study we engaged in a structured search strategy, with six main resources serving as sources of information:

- University of Manchester library catalogue;
- University of Manchester collection of electronic journals;

- electronic databases (i.e., the British Education Index, the Scopus database, and the ERIC collection);
- Google Scholar;
- the authors' personal bibliography on the topic; and
- cited work from the identified manuscripts.

Even though these resources overlapped at times, findings varied considerably; for instance, the library catalogue did not provide any significant results in the area of AL, while the majority of the identified papers were retrieved from online databases. The process used to retrieve papers from online resources was systematic. Resources were searched using the *and* and *or* operators on combinations of the following keywords: adventure learning, adventure-based, expedition-based, expedition, adventure, outdoors, virtual field trip, field trip, hybrid, online, learning, teaching, education, and distance education.

## Inclusion/Exclusion Criteria

As our interest is specifically on adventure learning as an approach to education, we decided to *include* all manuscripts that (a) focused on AL as a method of teaching/learning/design, (b) were guided by a formalized AL framework, and (c) utilized technology in delivering AL at a distance. Manuscripts that did not satisfy the inclusion criteria were *excluded*. These criteria lead to the exclusion of studies that focused on variants of outdoors education, virtual field trips, and expedition-based academics.

## Research Method

The synopsis of the articles included in this review adopts an evaluative and integrative approach with regards to their conclusions and warrants. The articles' methodology is discussed, and the authors' assumptions, claims, findings, and methods are evaluated. To engage in these tasks, we collected in two tables relevant information pertaining to the identified research studies (see Appendix). These tables facilitated the systematic analysis of the articles included in the review.

The analysis process started when it was agreed that further searches on the topic of interest failed to yield any additional manuscripts. At that point, we had collected 10 manuscripts dealing with the topic of adventure learning. Both authors then independently read the articles and met eleven times to discuss them. During our initial meetings we developed the skeletons for the tables (presented in the Appendix) to assist in gleaning all pertinent information from the papers. At each subsequent meeting we discussed the papers, added information to the tables, and added/removed columns from the tables according to new understandings that arose from our discussions. To analyze the collected data, we used the constant comparative method (Glaser & Strauss, 1967), arriving at salient categories and data patterns. Specifically, understandings from each paper were collected and analyzed individually to note emerging patterns and to gain a broad understanding of the issues surrounding adventure learning. Next, identified categories across papers were analyzed in search of common themes and meanings. Finally, the patterns

were compiled and analyzed in order to confirm and disconfirm the themes across all papers. Analysis across and between the papers continued until no more patterns could be identified. The identified patterns were then composed using the qualitative metasynthesis approach (Finfgeld, 2003; Sandelowski & Barroso, 2007) so as to derive a refined view of AL. In the words of Finfgeld (2003, pp. 894), the aim was to develop a "new and integrative interpretation of findings that is more substantive than those resulting from individual investigations." We decided to structure our paper in three sections that would allow the reader to easily approach the topic of interest; specifically, we discuss the following:

- current knowledge on adventure learning,
- knowledge gaps in the adventure learning literature, and
- ways to expand our knowledge and understanding of AL.

## Existing Understandings of AL

Prior to discussing the findings of the AL research, it is valuable to describe the type of research that has been conducted. At the time of writing, the adventure learning literature consists of six empirical (Table 1) and five theoretical manuscripts. Two of the empirical papers focus on teachers implementing the AL approach and integrating it in existing practices; one focuses on the students using geospatial data in the context of an AL project; two focus on the experiences of both teachers and students while engaging with the AL approach; and one focuses on the experiences of an explorer participating in the expedition team that delivered the AL program. All empirical manuscripts have been conducted with private and public K-12 schools in the United States, while one manuscript also included a community college. Most of the research conducted is qualitative in nature and uses the constant comparative approach to analyze the collected data. One manuscript uses the phenomenological approach to analyze participant experiences, while a second one analyzes survey data using factor analysis, correlational analysis, and structural equation modeling to identify factors influencing student and teacher motivation. Data for these studies have been collected using surveys, teacher and student interviews, student focus groups, and classroom observations.

Table 1

*Adventure Learning Research Studies*

| **Study reference** | **Project** | **Methodology** | | | **Participants*** | | **Setting*** |
|---|---|---|---|---|---|---|---|
| | | Type | Data | Method of analysis | Teachers | Students | |
| Doering & Veletsianos (2007) | GoNorth! Arctic National Wildlife Refuge (ANWR) (2006). | Qualitative research | Focus groups interviews with students | Constant comparative method | | *N* = 65 Caucasian middle-school students (girls = 45 boys = 20) | Two classrooms in the Midwest and one in the Northwest regions of the US |
| Doering & Veletsianos (2008a) | GoNorth! ANWR 2006<br><br>GoNorth! Chukotka 2007<br><br>GoNorth! Fennoscandia 2008 | Mixed methods | Teacher surveys, student surveys, student focus groups, teacher interviews | Constant comparative method | *N* = 24 teachers | *N* = 86 students | 22 public schools<br><br>1 private elementary school<br><br>1 community college (HE institution) |
| Doering & Veletsianos (2008b) | GoNorth! ANWR 2006 | Multiple case studies | Classroom observations, focus groups with students, personal interviews with teachers | Constant comparative method | *N* = 5 teachers | *N* = 123 students | 3 public elementary schools<br><br>3rd, 4th, 5th grade classrooms |
| Doering et al. (in press) | Polarhusky Arctic Transect 2004 | Mixed methods | Teacher interviews<br><br>Post-implementation survey | Constant comparative method<br>Factor analysis correlational | *N* = 21 teacher interviews<br>*N* = 228 teachers completed | | 4 special education teachers<br>1 gifted education teacher |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | | | analyses structural equation model | the survey | 5 elementary teachers<br>7 junior high teachers<br>1 high school teacher<br>2 teachers who combined grade levels<br>1 multi-district curriculum co-ordinator |
| Doering (2007) | Polarhusky Arctic Transect 2004 | Mixed methods | Teacher interviews<br><br>Survey | Constant comparative method | *N* = 21 teacher interviews<br>*N* = 228 AL users survey | Same as above |
| Miller, Veletsianos, & Doering, (2008) | Polarhusky Arctic Transect 2004 | Phenomeno-logical inquiry | Phenomeno-logical interviews | Hermeneutic phenomenolo-gical analysis | *N* = 1 educator/ explorer<br>Male | A dogsled expedition across Nunavut, Canada |

* The extent of detail on participating individuals, classes, and schools varies across the papers.

Our initial analysis included collating all definitions of adventure learning to check for consistency and meaning behind any changes to AL as evidenced by evolving definitions. Doering (2006, p. 200) defined adventure learning (AL) as "a *hybrid* online educational *environment* that provides students with opportunities to explore real-world issues through authentic learning experiences within collaborative online learning environments" (emphasis added). Doering and Veletsianos (2007) note that AL is a "hybrid distance education approach" while the Learning Technologies Collaborative (in press) describe AL as "a hybrid online learning framework" (p. 2) and as an "emerging theory" of online learning (p. 1). The inconsistent terminology in the literature leaves room for interpretation with regards to AL being an environment, approach, framework, or theory. A number of reasons explain why alternative terms have been used to define AL. First, AL is flexible and adaptable, allowing instructors and designers to integrate AL in varied ways in their learning environments (Doering 2006; Doering & Veletsianos, 2008b). Second, AL is a relatively new development in the field, which means that it is naturally evolving, leading researchers to work towards defining its boundaries. The use

of varied terms however creates ambiguity. Our understanding of the literature and work in this area, leads us to deem adventure learning as an *approach* for designing teaching and learning environments, whether those are online or hybrid, or used in face-to-face or distance education contexts[1]. In parallel, an adventure learning framework/model guides the creation of such learning environments.

The evolving nature of AL is supported by the fact that there exist two iterations of the adventure learning approach in the literature. The first iteration (Doering, 2006) situates adventure learning in seven interrelated principles:

- a research- and inquiry-based curriculum;
- opportunities for collaboration and interaction between participating students, teachers, experts, and content;
- use of the Internet for delivering the curriculum and the learning environment;
- timely delivery of media and text from the field to enhance the curriculum;
- synchronized learning opportunities;
- pedagogical guidelines for the implementation of the curriculum and the online learning environment; and
- adventure-based education.

The Learning Technologies Collaborative (in press) adds two principles to arrive at the second iteration of the adventure learning approach (Figure 1):

- identification of a specific issue and location of exploration, and
- delineation of an authentic narrative situating the learning experience.


*Figure 1*. The second iteration of the adventure learning model: AL 2.0 (from The Learning Technologies Collaborative, in press).

[1] To date, all AL implementations have been in the context of distance education.

To date, the AL projects and curricula described in the literature have been relatively large in size, scope, duration, and funding. Additionally, the projects have occurred in remote and extreme regions of the world and have focused on interdisciplinary socio-scientific issues of global concern (e.g., climate change). Nevertheless, the literature posits that adventure learning may apply to any location, learning experience, and content area (The Learning Technologies Collaborative, in press). Indeed, the second iteration of the AL approach is accompanied by a reformulation of the AL model into a practical guide for instructors to design their own AL projects, indicating a move towards smaller scale projects.

Doering (2006) writes that the utmost value of the AL environment is achieved when the appropriate pedagogy is defined and aligned with the curriculum and online learning environment, while teachers understand the curriculum, its relationship with the online learning environment, and their reinforcing relationship. Pedagogy (Doering & Veletsianos, 2008b), curriculum (Doering, 2007), and the inherent value of technology (Doering, Miller, & Veletsianos, 2008) appear prominently throughout the adventure learning literature. These themes parallel another innovation in the educational technology literature termed TPACK, or technology, pedagogy, and content knowledge (Mishra & Koehler, 2006), derived from Shulman's (1986, 1987) conceptualization of teacher knowledge. Specifically, the TPACK framework of teacher knowledge states that to effectively teach with technology, teachers should have knowledge of the dynamic relationship between technology, pedagogy, content area, and context. Both in the AL and the TPACK literature, deep understandings of these four items, but above all their interrelationships, are fundamental to the development and fostering of effective and powerful learning experiences and environments.

In recognition of the importance of pedagogy, adventure learning studies examined how teachers choose to integrate AL in their classrooms. Specifically, Doering and Veletsianos (2008b) identified four integration models that have been used: curriculum-based, activities-based, standards-based, and media-based approaches. Teachers who integrated AL in a curriculum-based model used the AL curriculum and calendar as they were written; teachers who adopted an activities-based model glanced at the curriculum to choose curricular activities and encouraged student-led activities; teachers who used the program in a standards-based fashion sought to meet the state standards requirements; and media-based integrators used the program and media for technology's sake. While it is commonly assumed that instructors will integrate innovations in the classrooms in a standard and uniform way, contextual factors and the complex nature of teaching and learning prevent homogeneous technology assimilation. The underpinning assumption in Doering and Veletsianos' (2008b) study was that AL integration would vary according to teachers' teaching style, pedagogical beliefs, and preferences; teachers whose teaching philosophy aligned with constructivism, for example, used AL in an activities-based fashion; whereas, others focused on the technology's "wow factor" implementing AL in a media-based manner. This research supports Doering's (2007) argument that the AL curriculum supports teachers' preferred approach to teaching, but casts doubt on the claim that more constructivist teaching occurs when AL programs are integrated in teaching. Notably, Doering et al. (in press) discovered that teachers who espoused constructivist pedagogical beliefs implemented the AL

program more intensely in their classrooms when compared to teachers who reported traditional pedagogical beliefs.

It appears that the flexibility built into the curriculum and learning environment allows AL to be used in unanticipated ways; it is therefore likely that use will align with teachers' pedagogical beliefs. While the AL approach may be grounded on constructivist notions of inquiry-based learning, teachers can repurpose the adventure learning approach according to their own needs and beliefs. Furthermore, the teachers who use AL the most appear to be those who already share the philosophical underpinnings of the AL approach. For example, AL curricula have incorporated three levels of activities, *experience*, *explore*, and *expand*, reflecting Jonassen's (1991) call for authentic experiences that encompass varying levels of difficulty and involvement. While experience activities introduce learners to basic concepts, and explore/expand activities require learners to pose their own questions and to solve their own problems, teachers may choose to focus on experience activities or to use the environment's media to provide quiet time for the children. Whether instructors are willing to adopt different teaching techniques and approaches to accommodate AL in their teaching still remains to be investigated and is a point to which we return in the next section of this paper.

Another focal point in the literature concerns the extent to which AL engages students. Doering (2006) argues that AL captivates and motivates students because it brings authenticity into the classroom. Investigations of the student experience with relation to motivation and engagement appear in Doering (2007), Doering and Veletsianos (2008a, 2008b), and Doering et al. (in press). Overall, the literature highlights student engagement and excitement to participate in AL-supported and AL-initiated learning tasks, collaboration, interaction, philanthropy, and community outreach. Specifically, results from the four research studies noted above indicate that (a) constructivist teachers reported higher student motivation, (b) collaboration and interaction between students, teachers, and explorers engaged learners in the tasks, (c) authentic data and connections provided motivation for students to engage in inquiry, and (d) students' motivation was driven by various facets of the online learning environment. Across all research studies, it appears that the features of the learning environment that engage the students are the

- weekly trail reports (weekly educator/explorer entries to the learning environment),
- dogs (polarhusky dogs that pull the dog sleds on the expeditions),
- send-a-note options (students are given the ability to send notes to the explorers),
- expert chats (participants are given the opportunity to chat in real-time with invited topic experts and explorers), and
- collaboration zones (locations within the learning environment where participants across the globe can contribute and collaborate).

Crucial to the effective implementation of AL is an understanding of the affordances for delivering a successful AL project. Affordances were defined by Gibson (1979) and refined by Norman (1988) as "perceived possibilities for action." Specifically, affordances are suggestions for action that are *perceived* by a user. Kirschner, Strijbos, Kreijns, and Beers (2004) delineated

three types of affordances (pedagogical, social, and technological), and Doering, Miller, and Veletsianos (2008) examined and applied this lens to adventure learning projects (Figure 2).

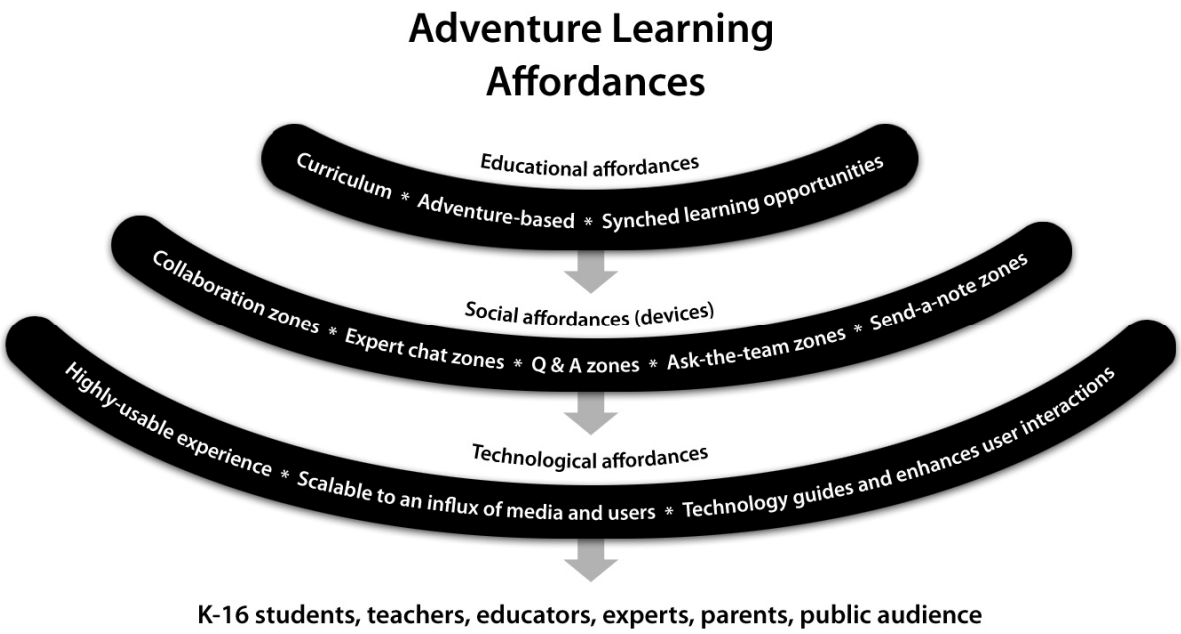


*Figure 2*. Adventure learning affordances (Doering, Miller, & Veletsianos, 2008).

Importantly, pedagogical, social, and technological affordances work in tandem to foster AL experiences. The implicit assumption behind this work is that educational interventions focusing solely on technological (or social or pedagogical) affordances are ineffective. This assumption echoes years of debate and research in the field regarding the relative focus that researchers should place on technology vis-à-vis pedagogy (Clark, 1994; Kirschner, Sweller, & Clark, 2006; Kozma, 1994) and the extent to which our focus should be directed on a single variable in the teaching and learning process (Tennyson, 1994). In the same way that learning is mediated by cognitive, social, *and* affective processes (Jones & Issroff, 2005), AL environments offer a combination of education-related possibilities for action. Doering, Miller, and Veletsianos (2008) argue that the educational affordances of AL rely on the fact that the curriculum constitutes the heart of AL. The second educational affordance, *adventure based*, draws learners and teachers into an unfolding storyline, while the third educational affordance, *synched learning opportunities*, draws connections between curricular goals, media artifacts, collaboration, and real-life events. Social affordances provide (synchronous and asynchronous) opportunities for collaboration and interaction between the expedition team, experts, students, teachers, and classrooms. Last, the technological affordances of an AL environment ensure usability and scalability while featuring technological innovations that heighten the user experience.

While Doering, Miller, and Veletsianos (2008) present a conceptual evaluation of the affordances responsible for successful adventure learning experiences and environments, Doering and Veletsianos (2008a) apply and research five indicators of "good" instruction to adventure learning

projects derived from Wilson et al. (2008), who argue that learning experiences should be evaluated according to effectiveness, efficiency, learner engagement, socially just outcomes, and transformational impact. Doering and Veletsianos apply these indicators to three years of adventure learning programs and provide evidence for AL experiences attending to all five indicators. Nevertheless, while the authors provide compelling evidence that the adventure learning programs and experiences evaluated are engaging, socially just, and, to a large extent, transformative, the evaluation of the learning effectiveness of the program relies on student- and teacher-reported data. We return to this issue in the next section of the paper.

## Knowledge Gaps in the AL literature

The adventure learning approach to education has received wide attention as more than 3 million students and thousands of teachers worldwide have participated in the GoNorth! programs (Doering, 2007). While interest in the approach has been evident and examples of innovative and meaningful student work have been well documented (e.g., Doering & Veletsianos, 2008a), learning outcomes in relation to curricular objectives have not been explicitly assessed. In the cases where attempts were made at evaluating learning, the evaluation depended upon teacher- and self-reported data (e.g., Doering & Veletsianos, 2008a). The AL literature would benefit greatly from future studies evaluating learning outcomes. It is important to note that such evaluations should use assessment strategies that align with the constructivist philosophy and inquiry-based nature of adventure learning. In other words, (a) research so far has not systematically evaluated the learning outcomes of adventure learning projects, and (b) we suggest that traditional assessment techniques (e.g., multiple choice exams) would not be appropriate ways to evaluate the effectiveness of the AL approach.

Additionally, while prior research identified a number of appealing features that were embedded in adventure learning projects (e.g., chats with experts), we see a need for research that specifically focuses on examining these engaging features of the AL approach. The hypothesis that AL can be applied in multiple contexts (The Learning Technologies Collaborative, in press) heightens the importance of gaining understanding of these facets of AL. Exploring the experiences associated with various aspects of adventure learning environments will allow designers and researchers to understand what and how various items contribute to the learning experience. By identifying the granules responsible for powerful AL experiences and researching their contributions and implications, researchers will be able to further enhance educational practice. More specifically, researchers are advised to investigate what current research has indicated are engaging aspects of the adventure learning experience. It should be noted that it may be difficult, if not impossible, to disaggregate these aspects of adventure learning; for this reason, researchers need to devise strategies that investigate these aspects of adventure learning in situ (Brown, 1992), using research approaches devised specifically for understanding real-life situations that cannot be investigated out of context (see next section).

The adventure learning literature has highlighted the flexibility and adaptability of the approach, noting that although AL is grounded on notions of inquiry and experiential learning the designed

interventions allow instructors sufficient freedom to select the components most compatible with their own pedagogy (Doering, 2007). Indeed, as already seen, Doering and Veletsianos (2008b) note different pedagogical models implemented by teachers who chose to integrate AL in their classroom. Nevertheless, we lack knowledge of *which instructors*, in *which situations* choose to implement such interventions in their classrooms. It is possible, for example, that AL is implemented in instances where the local situations and contexts are welcoming of such an innovation. For instance, as indicated by Doering et al. (in press), the teachers who choose to use the AL programs in an innovative fashion may be those teachers whose pedagogical and philosophical beliefs align with the AL approach. Another issue that influences adoption is legislation (e.g., if performance and funding is subject to external exams, teachers and schools may "teach to the test" rather than deviate from it). As discussed by Doering and Veletsianos (2008b), use of the AL program diminished around the time of state and federal mandated exams and testing. In other words, although some teachers may be interested and willing to use such innovations, the incompatibility of this approach with curricula that are standardized and deterministic precludes teachers from implementing AL. Interestingly, and adding another layer of complexity to the points raised above, the AL literature has also noted that some teachers have implemented AL projects in ways that they deemed enabled their students to score higher on the standardized tests (Doering and Veletsianos, 2008b). The literature however does not present a clear picture of how AL was implemented for this purpose and how AL was adapted to fit state and federal mandates.

While current AL literature notes the value that students and teachers find in collaborative activities (e.g., Doering & Veletsianos 2008a, 2008b), the nature and influence of learner participation, interaction, and collaboration with others, in the context of adventure learning, has not yet been thoroughly investigated, even though work on these issues in different contexts (e.g., Scardamalia & Bereiter, in press; Stahl, Koschmann, & Suthers, 2006) might be valuable in guiding future research efforts. For example, it would be worthwhile to investigate

- how students collaborate to solve common problems;
- how global interaction and collaboration influence learners' perspectives of their being in the world;
- the experience of remote cultures of the world that participate in global AL projects,
- the nature of cross-cultural collaboration and its impact on identity, engagement, and cross-cultural understanding (Veletsianos & Eliadou, 2009); and
- the nature of the relationship between learners and experts (with valuable insights from related literature such as the work of Kozma and Russell, 2005).

Furthermore, since learners are also empowered to act as experts in topics in which they are intensely vested (e.g., Inuit children involved in whaling), it would be worthwhile to investigate these students' experiences. What is the impact and meaning of this experience for participants? How does treating learners as valuable and equal contributors in educative endeavors influence their view of education? Is there any identifiable impact on their future educational career? How do they react to future classroom experiences that are "traditional"?

Finally, AL has only been implemented as a distance education approach in the K-12 environment in the context of large-scale projects focusing on socio-scientific issues of global concern. While these projects demonstrate the possibilities afforded by AL, the opportunities, limits, and viability of AL in other contexts need to be investigated. This can be done by designing and researching projects that

- are smaller in size and scope,
- explore other content areas, and
- focus on higher education.

## Adventure Learning Projects that are Small in Size and Scope

Doering (2006, pp. 213) claims that "the adventure of AL education does not have to be an extreme Arctic location. The education provided by individuals sharing content from their local environment …will assist students by providing authentic content that makes the unknown real." In the second iteration of the AL approach, the Learning Technologies Collaborative (in press) outlines how mini AL projects can be designed and delivered by individual teachers. The design, development, and use of smaller projects will be a critical factor in the diffusion of this innovation across education. Smaller projects will also highlight further intricacies that need to be accounted for when implementing AL programs.

## Adventure Learning Projects that Focus on Diverse Content Areas

By exploring additional content areas in which AL can be implemented, the viability of AL for education can be further evaluated. So far, it has been stated that AL is an approach to education that spans content areas, but research on the issue is lacking. An exploration of additional content areas will assist in answering a question that current research has left unanswered: Is AL an approach to education in general or is it an approach to social studies/science in particular? For instance, let's assume that a mathematics teacher wants to teach the properties of geometrical shapes and visits a building site with his/her students to do so. At the building site, students can take photos and videos, interview the carpenters, and document how mathematics is applicable outside of their classroom walls (Learning Technologies Collaborative, in press). While these activities align with the AL approach, the learning objectives of mathematics also need to be at the heart of the experience: "The development of curricula and online environments must situate the learning in an authentic environment knowing that the experiences are first and foremost for educational purposes, not the thrill of adventure" (Doering, 2006, pp. 201). Thus, when the teacher visits a building site and designs AL-based activities to teach geometry, the activities should align with the learning objectives and theories of mathematics education. For instance, in relation to geometry, Piaget's and Van Hiele's ideas are the most well known (Jones, 2002). Van Hiele's (1986) model, for example, suggests that learners advance through levels of thought. At the first level, students identify shapes and figures according to concrete examples. At the second level, students identify shapes according to properties. At the third, students identify relationships

between classes of figures. Thus, domain-specific models of learning such as Van Hiele's theory of geometrical thinking are invaluable in the design of AL experiences.

## Adventure Learning Projects that Focus on Higher Education

Experiential, authentic, participatory, and engaging education isn't only lacking in the K-12 environment, it is also a problem that faces higher education institutions. For this reason, and given the promising outcomes associated with AL, higher education experiences designed in an adventure learning approach would be worthwhile to explore. To date, no investigations have described work in this area, even though we see limitless possibilities for action. For example, what would an undergraduate business, applied arts, or organic chemistry course look like if it was designed using AL principles? What locations could students in these courses visit, what problems and activities could they engage with, and how would learner-expert collaboration look? AL offers valuable opportunities for higher education, where connecting learners with real-life and relevant explorations may be the links missing to make higher education experiential, authentic, and engaging.

## Bridging the AL Knowledge Gaps

We have so far discussed the state of knowledge in the adventure learning literature while also noting the knowledge gaps that exist in the literature. We have also attempted to pose lines of development and research that will be beneficial in pushing the field forward. In this section we identify two fruitful approaches to further evaluate and improve adventure learning.

As an educational intervention in teaching and learning, AL departs from the traditional mode of education in that it involves clear connections with authentic and experiential practices, innovative uses of technology, learner-expert collaboration, exciting storylines, and programs of study that focus on connecting individuals with the world outside of the classroom walls. To truly understand such multi-faceted programs we see a need for design-based research aimed at developing an empirically grounded theory through combined study of both the process of learning and the means that support that process (van den Akker et al., 2006). Design researchers work closely with their informants in a close relationship aimed at enhancing both theory and practice (Design-Based Research Collective, 2003) in what becomes a longitudinal cycle of research-informed theory and practice and of practice-informed theory and research. Connecting design-based research with the issue of learning outcomes identified in the previous section of this paper, Walker (2006) notes that design researchers have developed a range of techniques for generating good indicators of learning, such as close ethnographic observation and standard learning tasks with scoring rubrics. Rather than testing knowledge and comprehension, AL-based assessments should investigate learners' expertise in inquiry and synthesis and their development of solutions that tackle real-world issues. Beyond learning outcomes, design-based research can shed light not only on the cognitive and affective domains but also on the conative domain, on the learner's striving, desire, and determination to truly engage with the content area (cf. Reeves, 2006). Finally, design research also aligns with the implicit assumption behind AL 2.0 (The

Learning Technologies Collaborative, in press), namely that practitioners have valuable design insights that improve practice and theory. Empowering the practitioner to develop his or her own AL project also necessitates a willingness to collaborate with the practitioner in enhancing the adventure learning approach by contributing design knowledge to what works and what doesn't work in different contexts (Reeves, Herrington, & Oliver, 2004).

Future investigations could adopt an activity theory perspective to investigate the subjects, mediating artifacts, rules, outcomes, and divisions of labour within the communities participating in AL projects (Figure 3). For instance, the teachers and students who interact with the AL experts form a community that has its own division of labour, tools, and rules: In the GoNorth! Projects, the students expect the expedition team to upload a weekly update every Monday morning. Another example relates to the students following certain rules when they pose their questions to the experts; for example, all questions are moderated by a facilitator before being submitted to the expert who is participating in the day's session. Therefore, students know that some of their questions will be chosen to be answered and other questions will remain unanswered. The tools that students use to interact with others (e.g., collaborative maps) are mediating tools coordinating their activity (Kaptelin & Nardi, 2006). Students', teachers', and designers' goals also vary widely and may misalign. An investigation of the features of AL from an activity theory point of view will shed additional light on the way communities and activities in adventure learning endeavours are formed and enacted.

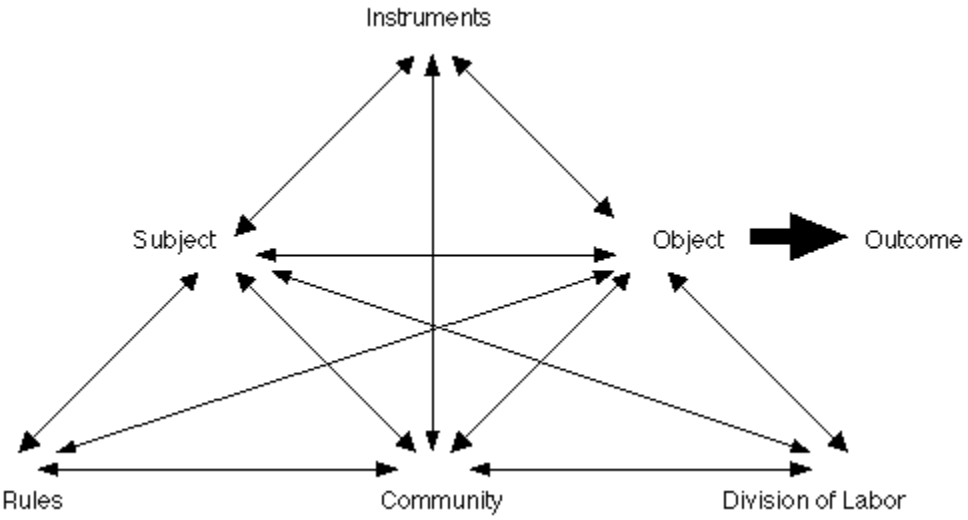


*Figure 3***.** Components of an activity system (from Engeström, 1987).

## Conclusion

In this paper, we presented the state of knowledge on the adventure learning approach, identified current knowledge deficiencies, and discussed future research and development directions. While the AL approach demonstrates great potential for enhancing educational practice with the use of technology, we identified ample opportunities for research and development, along with possible research/development venues. Research and design in this area will benefit by (a) taking a design-

based research perspective such that immersion in context and close collaboration between researchers and practitioners enhances both theory and practice, and (b) subscribing to an activity theory lens to further understand the granulations surrounding the diverse forms of activities and (overlapping) activity systems that are in place.

The adventure learning approach to education is grounded in innovative practice, a strong theoretical base, and positive research results, and, as such, represents a powerful development in the field. While adventure learning research, along with research on closely related developments and theoretical foundations upon which AL is based (e.g., Greeno, 1998; Herrington, Oliver, & Reeves, 2006; Scardamalia & Bereiter, in press; Stahl, Koschmann, & Suthers, 2006), is very promising, we see a need for additional investigations into the intricacies of this approach. Further research on the issues identified within this paper will be beneficial in assisting with the evolution, refinement, and maturation of the adventure learning approach. A deeper understanding of the approach and its implications is imperative in furthering adventure learning practice and experiences, and this paper takes an initial step in that direction.

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# Appendix

Table 1

*Adventure Learning Research Papers Template*

| Reference | Project name | Methodology and methods<br>• type of study<br>• data sources<br>• method of analysis | Participants<br>• Sample size<br>• Gender<br>• Sample group (teachers, students) | Setting<br>• grade(s)<br>• type of school | Findings | Proposed future research | Identified shortcomings & problems |
|---|---|---|---|---|---|---|---|

Table 2

*Adventure Learning Theoretical Papers Template*

| Reference | Project name | Main points | Implications & recommendations for research and practice | Identified shortcomings & problems |
|---|---|---|---|---|