

# Asking the Right Questions: Using Reflective Essays for Experiential Assessment

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## Abstract

**Background:** Experiential educators face difficulties assessing participants and programs because there are so many measurement tools to choose from, many measures have validity issues such as those based on self-reported data, objective tests may not adequately measure social or psychological outcomes, and tests in content disciplines often assess knowledge rather than skill in synthesis, analysis, or evaluation. **Purpose:** We hypothesized that an open-ended essay final would reliably measure individual growth, internalization of foundational threshold concepts in our disciplines, and the effectiveness of our outdoor, interdisciplinary program. **Methodology/Approach:** Student essays contained 36 student-generated concepts spread across our four disciplines (biology, writing, history, and recreation) which we compared with 20 threshold concepts from professional literature. **Findings/Conclusions:** Individual students identified about half of the concepts generated by the whole group, illustrating that their learning varied significantly. Our group identified 13 of the published threshold concepts. Students demonstrated comprehension of threshold concepts—foundational ways of seeing—as opposed to restatements of information from teachers’ lectures. **Implications:** Writing essays aids permanent cognitive and behavioral learning; coding responses to open-ended essay questions for threshold concepts can be a valuable tool for both individual student and program assessment in experiential education.

## Keywords

assessment, threshold concepts, reflective essays, cognitive development

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Experiential learning has the potential to educate young people to be engaged and competent citizens as they face problems that have complex and amorphous causes, such as climate change and world poverty (Heinrich, Habron, & Johnson, 2015). Experiential pedagogy is effective and adaptable because it “uses a mixture of content and process pedagogy” and “places a value on a learner’s relationship with the content” (Heinrich et al., 2015, p. 375). To prove these potential benefits and address general calls for greater accountability generally in education, experiential programs must use evidence-based assessment (Ewert & Sibthorp, 2009; Galloway, 2000). Specifically, assessment should show that students are achieving outcomes dictated by the sponsoring institutions, demonstrate the value of programs in relation to costs and benefits, and illuminate how to improve curriculum (Priest, 2001). However, experiential education’s versatility and complexity make assessment difficult, so experiential educators often observe participant growth that is difficult to measure. They also must choose between a plethora of assessment methods (Schary & Waldron, 2017).

In this article, we will review some of the difficulties surrounding assessment in experiential education and describe our use of reflective essays that synthesize learning as a tool for evaluating both individual students and programs. At the end of Integrated Natural History-Utah (INHUT)—an interdisciplinary, field study program—rather than test students on facts, we asked them to write open-ended essays about what they learned concerning our subjects of study, their personal growth, and their relationships to each other and the natural world. We had anecdotal evidence to suggest that such a test would best measure both objective and subjective components of what students had learned, and we predicted that these conceptual statements would relate positively to published lists of threshold concepts for each of our disciplines.

## **Review of Literature**

### *Assessment in Experiential Education*

Many post hoc assessments use anecdotal or self-reported data, raising issues of validity (Bailey, Johann, & Kang, 2017; Lariviere, Couture, & Ritchie, 2012; Schary & Waldron, 2017). Also, many assessment tools fail because of confounding variables (Ewert & Sibthorp, 2009), ignorance of how the brain learns (Kirschner, Sweller, & Clark, 2006), or the complex nature of experience, which has both objective and subjective elements (Qualters, 2010). Also, few tests measure critical thinking or permanent cognitive change (Heinrich et al., 2015). Another difficulty is that many educators want their programs or experiential courses evaluated according to common standards in a discipline, not merely according to criteria unique to that program. Because of these difficulties, educators should choose assessment tools that can deal with both concrete/objective and social/psychological/attitudinal outcomes, and evaluators should compare their students’ responses to criteria drawn from the relevant discipline.

Some of the confusion about assessing experiential education programs comes from misunderstanding what experiential education is and what it can and cannot do. Kirschner et al. (2006) write that many experiential educators follow constructivist

philosophies—that students best learn through unmediated experience. Their study concludes that successful experiential educators provide scaffolding by modeling, contextualizing, and dialoguing with participants during the experience. For example, Heinrich et al. (2015) completed a study of ways to measure critical thinking across four experiential learning settings. They concluded, “While experiential learning pedagogy addresses many of the knowledge sets, skills, and behaviors of engaged citizenry, it does not by itself develop critical thinking” (p. 375). Kolb’s learning theory, they suggest, “focuses heavily on the individual, perhaps leaving out inputs of time, context, and environment” (p. 375). In addition, constructivist directors and teachers may assume that learning progresses in a step-by-step manner—experience, reflect, critique. After examining the history of and contemporary responses to this assumption, Seaman (2008) concludes that, if learning is synchronic, spontaneous, and complex, any curriculum that dogmatically relies on the Kolb Cycle might miss taking advantage of the rich and holistic nature of human experience by focusing on its individualistic, mechanistic, and rationalistic aspects. Any assessment based on faulty theories may have biases that the evaluators do not consider.

Even when educators contextualize the experience, emphasize the spontaneous, unordered, and complex nature of experiential learning, and emphasize reflection during and after the experience, measuring growth can be difficult. Anecdotal accounts are methodologically suspect (Lariviere et al., 2012). Measures such as focus groups, interviews, and written surveys depend on self-reported data, which is only as reliable as the participants are honest and perceptive. Also most tests are administered post program because of the difficulty of collecting data in the field (Bailey et al., 2017; Ewert & Sibthorp, 2009). Self-reported data in the form of surveys are subject to confounding variables such as social desirability of positive outcomes and post-experience euphoria (Ewert & Sibthorp, 2009). Self-reported data can be especially problematic when gathered from vulnerable populations (Lariviere et al., 2012). Behavioral assessment (such as structured observation) and physiological data (such as heart-rate monitors and measurement of brainwave data) are concrete and specific measures of social or psychological aspects of learning (Lariviere et al., 2012). However, the psychological tests and physiological measurements are difficult to use outside of laboratory conditions. In addition, most programs want to evaluate knowledge and attitudes specific to a given discipline. Objective tests measure disciplinary knowledge with validity but do not reveal much about psychological and/or social constructs such as self-efficacy, self-esteem, and cohesion (Schary & Waldron, 2017). In summary, most assessment tools measure only part of what scaffolded experience can teach.

Some researchers have found that reflective essay writing considers both knowledge and attitudes, objective and subjective growth. Not simply a reflective entry in a journal, an essay is a consciously structured synthesis of learning across a period of time. Essay writing is performative and measures ability to articulate knowledge and cognitive growth in a way that a multiple-choice test or a self-reported survey cannot. Also, essay writing aids students in constructing new or deeper understanding (Kellog, 2008).

Wright and Tolan (2002) blended a ropes course with community engagement, and successfully used a reflective essay at the end to evaluate student progress. This

method allowed students to express knowledge of principles, cognitive growth, and emotional growth in attitudes, self-concept, and confidence. Heinrich et al. (2015) assigned students to describe a video, write a blog post that summarized course readings, and write an essay that would synthesize course principles and personal observations. They evaluated student statements involving critical thinking against five dimensions developed by the American Association of Colleges and Universities. Evaluation of student writing in this study showed that strong outcomes came from properly scaffolded instruction in critical thinking.

This study also shows that assessing student essays for learning in a subject requires a comparison of student work to what professionals think is significant learning in that discipline. Many such descriptions of advanced knowledge exist—such as the researched learning outcomes required by a university or rubrics developed for specialized groups of learners such as that used by Heinrich et al. (2015) or the Self-Reflective Writing Scale developed by So, Bennett-Levy, Perry, Wood, and Wong (2018). Such standards have value in specific and limited applications, but we wanted to develop a rubric that would measure both disciplinary and holistic growth in our students. We knew that whatever assessment tool we chose, it would have to arise from our basic assumptions about how growth occurs.

### *Cognition, Learning, and Threshold Concepts*

Like other experiential programs, a program like ours that uses writing to further education in university subjects seems to work better when experience is guided by experts (Kellog, 2008; Kirschner et al., 2006). Our paradigm for INHUT was mentored experience; we had four faculty members and a graduate student teaching the 17 students. In addition, we used frequent reflective journal exercises to explore material and attitudes. More theorists and practitioners than can be named here have written about the connections between experience, cognition and writing, but especially important to experiential writing programs like ours are the ideas of Dewey and Vygotsky concerning the tension between individual and social construction of meaning from the raw materials of physical and cultural experience (Dewey, 1916, 1925; Glassman, 2001; Vygotsky, 1934). Our approach to writing corresponds directly with Vygotsky's (1934) work in *Thinking and Speech*:

The relationship of thought to word is not a thing but a process, a movement from thought to word and from word to thought . . . Speech does not merely serve as the expression of developed thought. Thought is restructured as it is transformed into speech. It is not expressed but completed in the word. (p. 251).

Most assessment instruments concern themselves with prior knowledge; multiple-choice tests and surveys are not designed to create new learning. They are easy to administer and quantify because they limit language, reducing the complexity of speech and writing to simple memory recognition. Also pertinent to our methodology is Flower and Hayes's (1981) "A Cognitive Process Theory of Writing," in which they connect the study of how we learn from experience with the study of the writing process.

In searching for a standard to measure our students against, one that would match our ideas about learning, cognition, and experience, we also wanted to select principles that professionals remember and can articulate 5 or 10 years after they leave formal education. Fink (2003) writes that signs of good outcome are that the “course results in significant changes in the students, changes that continue after the course is over” (p. 7). According to Leamson (1999), significant learning changes the brain: “makes the brain different than it was before, and permanently so” (p. 14); he explores cognition in terms of biological brain change and emotional learning in terms of expression and dramatic social action. More recently, scholars have used the term “threshold concepts” to describe such permanent disciplinary learning (Meyer & Land, 2005), but little has been published on how to assess whether students have learned these concepts.

Statements of threshold concepts consider how knowledge is structured in disciplines and how subjective and objective understanding relate (Cronin, 2014; Sendziuk, 2014). These are foundational and enabling concepts that are necessary before an individual can begin study in a discipline. For example, a science student must both understand and trust empirical methodology (the scientific method) before constructing experiments and writing up the results. Threshold concepts are often difficult to learn, such as the concept that truth is always contextual in historical study or that writing is a means for creating meaning and not merely a vehicle for communicating previous understanding.

Meyer and Land (2005) describe threshold concepts as “critical moments of irreversible conceptual transformation in the educational experiences of learners” (p. 373). They further describe these as “‘conceptual gateways’ or ‘portals’ that lead to a previously inaccessible, and initially perhaps ‘troublesome’ way of thinking about something” (p. 373). These concepts are characterized by being transformative, irreversible, and integrative. In learning threshold concepts, students find the discipline opening up to them as they undergo an identity transformation. These concepts both impede and invite the students, so the job for teachers is to recognize and articulate these “epistemological obstacles” and try to help students get beyond them (Meyer & Land, 2012, p. 5). Threshold concepts can be valuable both to the teacher in creating curriculum and to students as they begin to navigate the discipline (Yancey, 2015). They function as both “propositional statement and heuristic for inquiry” (Yancey, 2015, p. xxvii). In addition, statements of threshold concepts are organic, not canonical or fixed. Perkins (2010) writes that threshold concepts are continually evolving and are more “exploratory and eclectic than categorical and taxonomic” (p. xlv). They are difficult to explain and practicing members of a discipline may have forgotten their own experience of learning these concepts, thinking of them as intuitive or universally understood, and they may not articulate them explicitly or have the students articulate them back (Adler-Kassner & Wardle, 2015; Cronin, 2014; Meyer & Land, 2012; Sendziuk, 2014).

While some threshold concepts are specific to each discipline, many are shared between disciplines; for example, both biologists and geologists deal with issues of scale and time. Because writing is essential to every discipline, Adler-Kassner and Wardle (2015) suggest that threshold concepts in that discipline are “critical for anyone who wants to write more effectively, whatever their discipline or profession” (p. xiii).

### Threshold Concepts in INHUT Disciplines

Our students (ages 18-23) in INHUT studied introductory biology, Utah history, recreation management, and freshman writing. Scholars in our four disciplines have studied threshold concepts to varying degrees. Biology teachers have not used threshold concepts to a great extent since the idea was proposed by Meyer and Land (2005), but Ross et al. (2010) used threshold concepts to describe abstract ideas fundamental to the field. Although the term threshold concept remains unfamiliar to most historians, several have explored using threshold concepts as a mechanism for helping new post-graduate history teachers and tutors communicate historical thinking more effectively to undergraduates (Adler-Kassner, Majewski, & Koshnick, 2012; Cronin, 2014; Pace, 2004; Sendziuk, 2014; Wineburg, 2001). Leisure studies and recreation management threshold concepts are in their infancy. Harris (2015) suggests that the general threshold concepts as developed by Meyer and Land (2005) might be applied to leisure studies teaching, but only goes so far as to point out personal anecdotes, illustrating several leisure studies concepts that were transformative and troublesome. For the discipline of writing, Adler-Kassner and Wardle (2015) identify five main categories. Table 1 lists threshold concepts for each of our INHUT disciplines, as synthesized from the professional literature.

**Table 1.** Published Threshold Concepts for Each Discipline.

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Published threshold concepts for each discipline

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Biology	<ul style="list-style-type: none"> <li>• Life is diverse. Variation occurs at all scales considered in biology.</li> <li>• Correspondences between and among energy, nutrients, transformations, concentrations, and equilibria are key to understanding biology.</li> <li>• Change through time occurs at most if not all scales of biology.</li> <li>• Most major themes in biology follow probability gradients rather than simple binary yes or no ones.</li> <li>• Understanding biology requires considering both randomness and determinism.</li> <li>• The scale, ratios, and proportions of biological entities can affect the answer to a given question.</li> <li>• Hypotheses need to be proposed, tested, and modified to understand biological concepts.</li> </ul>
History	<ul style="list-style-type: none"> <li>• Historians interpret the past, not just memorize and arrange data.</li> <li>• There are multiple possible and plausible interpretations.</li> <li>• Evidence cannot be accepted at face value.</li> <li>• The sources and tools of history cannot establish the definitive version of the past.</li> <li>• People in the past lived and operated in a context different than our own.</li> </ul>
Recreation management	<ul style="list-style-type: none"> <li>• They practice the principles of interpersonal negotiation.</li> <li>• They also understand multiple social justice issues of social class, gender, ethnicity, and disability.</li> <li>• Leisure professionals understand the value of merit goods and externalities.</li> </ul>

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(continued)

**Table 1. (continued)**

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Published threshold concepts for each discipline

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Writing	<ul style="list-style-type: none"> <li>• Writing is (also always) a cognitive activity.</li> <li>• Writing enacts and creates identities and ideologies.</li> <li>• Writing is a social and rhetorical activity.</li> <li>• Writing speaks to situations through recognizable forms.</li> <li>• All writers have more to learn.</li> </ul>
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*Description of Program and Study*

As INHUT students explored Utah, they studied the relationships between human recreational and economic practice and plant and animal systems. We held classes at the university (a reading class during the winter) and in the field (6½weeks in the spring when we traveled to about 20 locations throughout Utah. In both classroom and field, we studied the principles of inquiry for each discipline, through lecture, discussion, reflection, and both library and empirical research. At the end, students were required to write four papers, a personal essay, an opinion piece on recreational land use, a write-up of their own biology study, and a research paper on some aspect of Utah history. In addition, they wrote a final reflective essay that asked them to synthesize their own learning.

Central to our objectives and our daily practice were the field notebook and the reflective journal. Daily, they used their journals to process what they were learning. Sometimes this writing time was solitary, but several times each day we gathered to write on a specific prompt, read from their journals to each other, and discuss the issues raised by the prompt.

As can be seen from Table 2, we crafted objectives that would reinforce the interdisciplinary, experiential, discussion and reflection-based, and project-driven nature of the program.

**Table 2.** Integrated Natural History Learning Outcomes.

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1. Build a discourse community of peregrine Christian humanist historian scientist recreationist writerly scholars.
  2. Learn outdoor skills and critical thinking. Learn that any system can be read like a text.
  3. Learn the ways of thinking particular to the disciplines of history, science, recreation, and English.
  4. Learn conventions and techniques for college level writing, reading (six books), and research in history, science, recreation, and English.
  5. Learn the rhetorical patterns of persuasive, informative, expressive, and literary writing.
  6. Establish an efficient personal process for efficient research and writing for your college career.
  7. Discuss the ways arguments work within discourse communities.
  8. Learn to use a personal and scholarly notebook for recording pertinent facts and for meditative personal writing.
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These objectives concern disciplinary knowledge and skills, subjective attitudes, and behaviors that affect concepts of self and relationships.

## **Methods**

As their final test, we asked the 17 students to write a four-part essay answering the following questions: “What have you learned about biology, Utah history, writing, and recreation management?” and “What have you learned about your relationships to yourself, other people, and the natural world.” Subsequent to the program, we applied for and received approval from the Brigham Young University Institutional Review Board to study these essays.

To evaluate our program, we first performed textual analysis, asking, “What key ideas did students articulate in their essays?” A secondary question became, “What was the incidence of specific concepts in the students’ essays?” Finally, we asked, “What themes and language in the students’ synthesis of concepts learned are similar to the themes and language in published threshold concepts for each discipline?”

As we coded the essays, we focused on statements of concepts and did not extract supporting evidence, descriptions, or anecdotes. We then summarized the collected concept statements, striving to retain student language. As common themes emerged, we combined or divided concepts to show distinctions and commonalities. We found that answers to the three-part relationship question corresponded well with the answer to “What did you learn about recreation?” consequently, we classified those responses together. We identified 36 student-generated concepts spread across the four disciplines and compared them to the 20 concepts gleaned from professional literature. We then tallied the incidence of the student-generated concepts, noting which students articulated which concepts. We considered which concepts had low versus high representation. We explored which disciplines had the highest percentages of concepts described, and we compared numbers of concepts described to numbers of words used to discover whether there was correlation between essay length and numbers of concepts. Finally, we examined students’ majors to see if they articulated more concepts in their discipline than students not in their discipline.

## **Results**

Our coding resulted in 36 concepts created by students. At the end of our study, when we compared the concepts our students learned with those published in each field, we found that 14 out of the 36 concepts created by students were closely similar to the 20 published threshold concepts, as demonstrated in Table 3.

When we tallied incidence and noted which students articulated which of the concepts articulated in their essays, we found that all 16 of the students (one student decided not to include their essay in the study) answered primarily with descriptions of concepts rather



**Table 3. Comparison of Student-Generated Concepts and Professionally Published Concepts.**

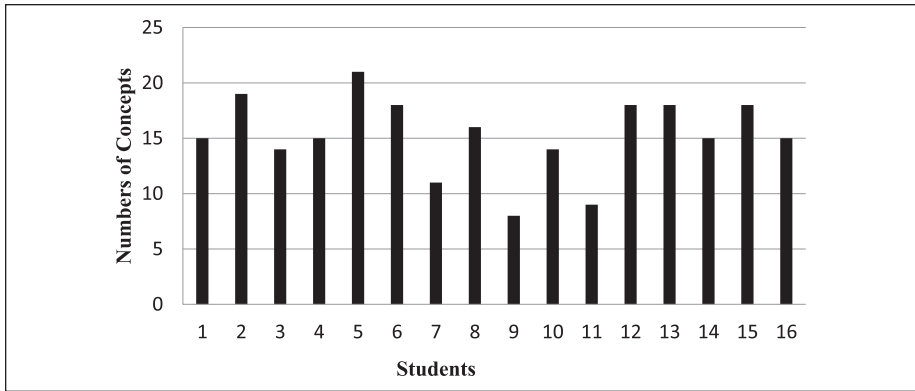
	Concepts articulated in student essays	Published threshold concepts for each discipline
Biology	<ul style="list-style-type: none"> <li>* The diversity of life, especially of plants and animals is astounding, complex, beautiful, and most importantly knowable.</li> <li>* Things do better in a diverse living community and people can impact those communities.</li> <li>** Living things are specifically adapted to fit into their world. It seems fickle and fragile at first, but changes to be amazingly resilient.</li> <li>• Living things are intricate and complex, even in smell and to the touch. I now see more than greenery in the shrubs, even in the desert.</li> <li>• The natural world is deep and old in time and wide in expanse.</li> <li>• Humans use living things for their own survival and needs, but more importantly living things survive and reproduce for their own sakes.</li> <li>• The more you experience a place the more interesting it becomes.</li> <li>• Carrying around a field notebook and being ever-ready to write, record, identify, and investigate made for a better experience.</li> <li>* Historical interpretation is complex, because people have diverse worldviews, perceptions, and motives; the past is morally complex and messy.</li> <li>* History is more than names and dates; it involves interpreting the past.</li> <li>** Historical interpretation requires critical examination of numerous kinds of sources and multiple sources.</li> <li>• Historical analysis can enable objective observation of controversial events.</li> <li>• Knowing past trends and events can help observers read present trends and events; history allows us to understand ourselves better.</li> </ul>	<ul style="list-style-type: none"> <li>* Life is diverse. Variation occurs at all scales considered in biology.</li> <li>** Correspondences between and among energy, nutrients, transformations, concentrations, and equilibria are key to understanding biology.</li> <li>• Change through time occurs at most if not all scales of biology.</li> <li>• Most major themes in biology follow probability gradients rather than simple binary yes or no ones.</li> <li>• Understanding biology requires considering both randomness and determinism.</li> <li>• The scale, ratios, and proportions of biological entities can affect the answer to a given question.</li> <li>• Hypotheses need to be proposed, tested, and modified to understand biological concepts.</li> <li>* Historians interpret the past, not just memorize and arrange data.</li> <li>** There are multiple possible and plausible interpretations. Evidence cannot be accepted at face value.</li> <li>** The sources and tools of history cannot establish the definitive version of the past.</li> <li>• People in the past lived and operated in a context different than our own.</li> </ul>
History		

(continued)

Table 3. (continued)

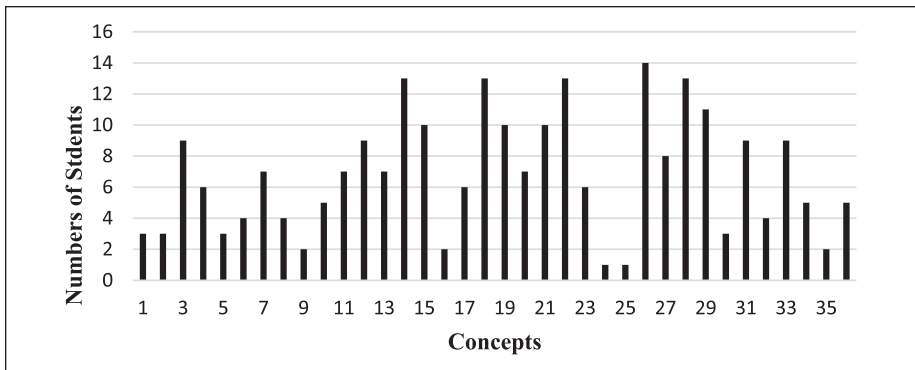
	Concepts articulated in student essays	Published threshold concepts for each discipline
Recreation management	<ul style="list-style-type: none"> <li>* Recreation connects you with people.</li> <li>** Communication skills, especially listening to and learning from others, are skills that can be learned and that make group processes work well.</li> <li>** Being in nature is a fundamental need (heals me, helps form identity by stripping away superficialities, helps me see others and myself more clearly).</li> <li>** Identity formation is a process; recreation and education in a natural setting is a canvas for identity development.</li> <li>• I can do hard things.</li> <li>• I can retain or regain my sense of wonder</li> <li>• Seeing complexity and beauty in diverse people enables good relationships in a group.</li> <li>• Balancing group time and alone time is essential for each group member's happiness</li> <li>• I understand the difference between perceived risk and real risk.</li> <li>• Good leadership requires planning, preparation, skill, and adaptability.</li> <li>• A multiplicity of lifetime recreational choices and resources are available to people. Discovered personal recreation preferences.</li> <li>• A broad variety of recreation resources are available to me.</li> <li>• The most important element of recreational safety is good judgment (risk management)</li> <li>• Being in the wilderness has increased my confidence (self-efficacy) in my camping and outdoor skills</li> <li>• Stakeholders have different ideas about appropriate land use.</li> <li>• Love and appreciation for the outdoors leads to better respect and care for the outdoors. Nature is important and beautiful.</li> <li>• Nature will be respected and cared for by those who love and appreciate it.</li> <li>* Writing can help formulate thoughts, clarifying patterns and connections.</li> <li>** Reflective writing can be a therapeutic journey, a tool for learning about self.</li> <li>*** Writing is translating your thoughts and making them meaningful to others.</li> <li>• Writing well is a process that involves redrafting.</li> <li>• Good writing moves between precise facts and details and abstractions.</li> <li>• Writing can be enjoyable.</li> </ul>	<ul style="list-style-type: none"> <li>* They practice the principles of interpersonal negotiation.</li> <li>** They also understand multiple social justice issues of social class, gender, ethnicity, and disability.</li> <li>• Leisure professionals understand the value of merit goods and externalities.</li> </ul>
Writing		<ul style="list-style-type: none"> <li>* Writing is (also always) a cognitive activity.</li> <li>** Writing enacts and creates identities and ideologies.</li> <li>*** Writing is a social and rhetorical activity.</li> <li>• Writing speaks to situations through recognizable forms.</li> <li>• All writers have more to learn.</li> </ul>

than with lists of memorized facts. Out of the total concepts created by all students, the range was 8 to 21 concepts described by individual students, as can be seen in Figure 1.



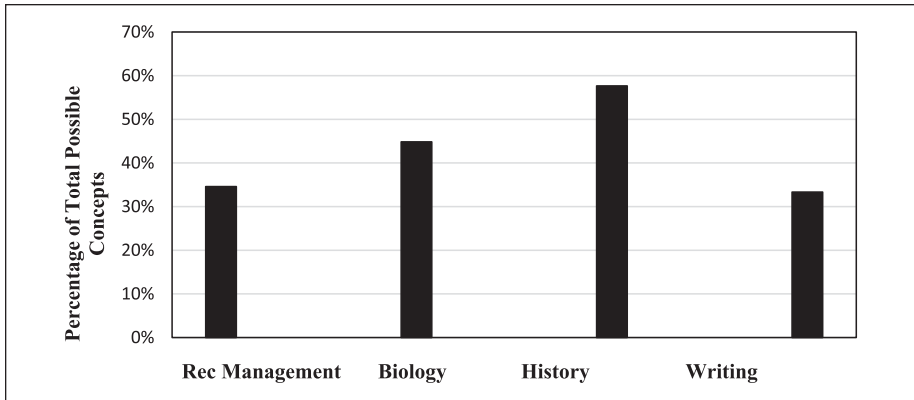
**Figure 1.** Number of concepts articulated by each student.

The average number of concepts articulated by each student was 15.3, with 13 of the 16 students describing 14 concepts or more. We then considered how many students expressed each concept, and the range was 1 to 14, the average being 6.8 students per concept. Figure 2 shows which concepts were most commonly and least commonly articulated by students.



**Figure 2.** Number of students who articulated each concept.

On average, each biological concept was articulated by 7.6 students, each historical concept by 9.8 students, recreational concepts by 5.9, and writing by 5.7. So, as Figure 3 illustrates, historical concepts were articulated almost twice as many times as writing concepts were. Even when we normalized the data, students still articulated the highest percentage of the possible concepts in history (58%) and the lowest in writing (33%).



**Figure 3.** Percentage of possible concepts articulated by the students in each discipline.

In terms of the concepts with the greatest incidence, 14 students articulated in various forms “Historical interpretation is complex, because people have diverse world-views, perceptions, and motives; the past is morally complex and messy.” Four other concepts were described by 13 of the 16 students.

We compared the numbers of words each student used with the numbers of concepts each student articulated to see whether writing a lot or writing a little produced the best evidence of learning. We calculated a range between 33.7 words per concept and 127.5 words per concept, with the average being 58.8. The students who articulated the most concepts were not stingy with words, but neither were they profligate with them. The student who used the most words per concept articulated the fewest number of concepts. The student who used the least number of words per concept ranked in the upper end of the spread of students. The student who overall used the highest number of words (wrote the longest essay) articulated a solid number of concepts but not the most.

When we correlated the students’ majors to the numbers of concepts, we discovered that humanities and arts students articulated the largest percentage of concepts for biology, history, and writing, and the social science students articulated the largest percentage of concepts for recreation management. Science students did not score more than other students in articulation of biological concepts, and social science students did not score more than other students in historical threshold concepts.

### *Biology*

Students articulated eight biological concepts (Table 2), as compared with seven threshold concepts gleaned from the literature. Four concepts were found in both professional and student-generated lists—variation, relationships, change, and scale. All the students in the course expressed an understanding of variation. One student wrote, “As we spent time in nature observing and learning about different species of plants and animals, I have come to understand how diverse life really is, even in the

desert.” The next most prevalent biological concepts articulated by students were relationships (59%) and change (41%). Only one student commented on scale (6%).

### *History*

Fifteen of 16 students wrote that the past is morally complex and messy and that this complicates the historian’s task of teasing out the diverse worldviews, motives, and perceptions that animated people’s choices in the past. Wrote one,

I’ve learned that history is not concrete, but complex. Today we don’t have one opinion and neither did they. . . . There are so many ways to view the past and the people of Utah’s past had many different views as well.

A closely related threshold concept is that historical analysis can enable objective analysis of controversial events. Thirteen of the 16 students articulated aspects of this concept in their essays. One student wrote, “I’ve come to better understand not only what happened across Utah but why it happened.” A third threshold concept involves the relevance of history for the present, an idea that was described by 12 of the 16 students. One student reflected, “If faced with courage, we need not live history’s tragic lessons multiple times. Fear is part of mortal life. But if we prioritize courage ahead of fear, that is where change happens.”

### *Recreation Management*

Students described principles relating to recreation leadership, recreational resources, safety, self-efficacy, the importance of nature to well-being, multiple-use perspectives, respect and care for the natural world, and identity development through leisure. These principles relate to the threshold concepts identified by Harris (2015) of social justice and interpersonal negotiation. One student wrote,

INHUT taught me about how I work in groups. It taught me that I can be a leader and help the group through a trail on Coyote Gulch as well as make important decisions quickly, such as how to set up camp, pack up camp, communicate with large groups, and get moving—all through serving others.

Commenting on the importance of nature to well-being, another student wrote, “I have learned that I need the outdoors. I am unhappy and unhealthy without it.”

### *Writing*

Students said that writing is an instrument for creating thought, not just for recording thought. They also articulated that writing is therapeutic and can be a vehicle for learning about self; these are connected to the published concept that writing creates and transforms identity (Adler-Kassner & Wardle, 2015). One student wrote,

The assignment to write a personal essay was so hard because I had to be honest with myself. It was scary because I had to let not only myself, but others see who I really am. It was hard, but it was also really helpful in understanding myself.

They also wrote that writing is shaping thoughts for others, a social activity. As students prepared the pieces that would go in their portfolio, they learned about and practiced different forms of writing, but they didn't articulate this as significant learning. Our students regularly discussed their developing pleasure in writing, an idea that is missing from the published threshold concepts. One student wrote, "Writing has taught me a lot about myself and how important it is to just sit down and write for enjoyment. I have very much enjoyed being able to learn through trial and error."

## **Discussion**

In general, this exploratory study showed us that coding open-ended essay responses and comparing them with nationally published lists of concepts is a viable tool for assessment of both individuals and programs. The tool for assessing student work was the same tool for an assessment of our program. This may prove an efficient model for other experiential programs.

In their essays, students described the multifaceted nature of historical interpretation, the process of identity formation, their appreciation for a regained sense of wonder, the therapeutic nature of reflective writing, the complexity, interrelatedness, and delicacy of the biosphere, and many other examples of foundational learning. They expressed both theoretical concepts and subjective attitudes—ways of seeing as opposed to lists of facts. The concepts are not the kind of knowledge that could be crammed into short-term memory. For example, it's not easy to forget, once it's learned, that empiricism is essential to scientific practice or that historical interpretation is complex. Similarly, they articulated principles of their own well-being, their relationships, and their personal growth—such as the following concept: "Being in nature is a fundamental need (heals me, helps form identity by stripping away superficialities, helps me see others and myself more clearly)." This is the primary value, we think, of using reflective essay writing to assess experiential education—there is no extrinsic limit on the complexity of the student response, and the statements naturally blend what they think and what they feel. These statements can then be compared with published threshold concepts and with the stated learning outcomes for the course.

Comparing the frequencies of student-generated concepts with national threshold concepts enabled us to use student evaluations as program evaluations. Examining Table 2 shows that our students as a total articulated 70% of the threshold concepts that teachers believe classroom-bound programs across the country should learn. Turning to the specific concepts learned and the frequency that individual students articulated these concepts, we could discover the specific areas where improvement is most needed. We also learned how well various members of our faculty prompted students to articulate these concepts. Our history teacher succeeded in helping students see the connection between experience and conceptualization. Ironically, the lowest percentage of threshold concepts articulated was in the area of writing. While teacher effectiveness

may have been a factor, it may also be that students considered writing as a tool for gaining knowledge and as such was an aspect of all of the disciplines. When they were asked to think about writing as a subject, they mostly articulated concepts connected to personal writing, such as “Good writing is a healing experience.” This may have happened because the writing teacher is a creative writer, not a rhetoric and composition expert, and he focused on using writing to aid personal growth. Other programs can use coded reflective essays to evaluate effectiveness of the educators and the program.

An unexpected discovery was that students didn’t generally rank higher in concepts aligned with their chosen major, possibly because they were mostly freshmen and had not yet learned foundational concepts for their disciplines. While our numbers are so small that the differences are not statistically significant, we can wonder what it is about humanities/arts students that allowed them to articulate the concepts better. Perhaps our test evaluated writing ability above all else. If they wrote well, they articulated concepts well, using time efficiently so that their essays were neither wordy or incomplete. Studies demonstrate that students who write well do better in all their classes than students who don’t write well (Cumming, 2013; Pajares, 2003; Rose & McClafferty, 2001). Our results may simply show the importance of writing to every discipline.

Using an essay final worked because the students had already consistently reflected in writing on what they experienced. Learning to articulate concepts is learning mastery of those concepts; the act of articulation formalized the knowledge (Vygotsky, 1934). One implication of this for experiential education is that reflection is also a social activity, one enabled by speaking and writing (Seaman & Rheingold, 2013). As students reflect on experience, they are not merely finding words for prior understanding; they are negotiating meaning in a social context.

## **Limitations and Areas for Future Research**

We initiated our study after the program was over; consequently we had no a priori analysis to guide us and we didn’t have a control group. For these reasons and because our sample size was very small, we did not use a more complex analysis (regression). Similar to many studies of outdoor, experiential programs, we had uncontrolled variables. For example, the open-ended question seems to have helped students answer in threshold concepts, but we don’t know how the mentored, project-driven, interdisciplinary, and experiential aspects of the program aided this focus. A study comparing the concepts expressed by field study students with those expressed by classroom-bound students of the same biology, history, recreation, and writing classes could help determine the effect of the field study program on learning threshold concepts. Also, a longitudinal study, giving the same students a follow-up test 2 years after the program and asking them the same questions again, would help us explore the permanence of the knowledge gained.

Despite these limitations, this exploratory study suggests that a reflective essay final, when preceded by consistent reflection exercises in journals, can measure objective and subjective student growth. The results can be used to judge the effectiveness of the program and the individual teachers in achieving both the sponsoring institution’s learning outcomes and in mastering threshold concepts, which are complex descriptions of disciplinary learning.

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