

THE ACCURACY OF SELF-EFFICACY BELIEFS
IN OUTDOOR EDUCATION

by

Scott Schumann

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STATEMENT OF DISSERTATION APPROVAL

The dissertation of Scott Schumann
has been approved by the following supervisory committee members:

<u>Jim Sibthorp</u>	, Chair	<u>2/29/12</u> Date Approved
<u>Karen Paisley</u>	, Member	<u>11/22/11</u> Date Approved
<u>Edward Ruddell</u>	, Member	<u>11/22/11</u> Date Approved
<u>Ann Darling</u>	, Member	<u>11/22/11</u> Date Approved
<u>Doug Hacker</u>	, Member	<u>11/22/11</u> Date Approved

and by Daniel Dustin, Chair of
the Department of Parks, Recreation, and Tourism

and by Charles A. Wight, Dean of The Graduate School.

ABSTRACT

In the present era of outcome assessment and accountability, self-efficacy is a popular outcome measure in outdoor and adventure education. Self-efficacy beliefs are context specific perceptions an individual possesses about a likelihood of success in future tasks and are related to well-being confidence, and persistence. However, recent research findings refute the traditional view that more is better, when it comes to self-efficacy beliefs. Specifically, findings indicate that these beliefs can be inaccurate and can easily become inflated resulting in decreases in motivation and performance. Outdoor and adventure-based education is one such context to avoid the inflation of self-efficacy beliefs due to the physical and educational consequences associated with failure (e.g., psychological harm, injury, or death).

The following research examined a proposed seven factor structure of outdoor education practice. Exploratory factor analysis results ($N = 303$) indicated a 23-item, 5-factor structure which included (a) instruction and assessment, (b) outdoor classroom management, (c) technical skill, (d) interpersonal skill, and (e) environmental integration. Confirmatory factor analysis ($N = 200$) examined the fit of this model. Results indicated an acceptable fit with strong internal consistency and convergent validity for the Teaching Outdoor Education Self-Efficacy Scale with 22 items (TOE-SES 22).

Subsequent research examined the effects of a monitoring intervention on the *accuracy* of teaching outdoor education self-efficacy beliefs. Treatment group participants on National Outdoor Leadership School Instructor Courses predicted their

performance (a self-efficacy belief) before teaching a course topic, self-assessed that performance, and compared the accuracy of their predictions and self-assessments to an expert evaluation of their performance. Results indicated outdoor educators-in-training integrated this information and calibrated their TOESE beliefs better than the control group.

Attending to the accuracy of teacher self-efficacy beliefs early in an educator's career may help him approach or avoid tasks when appropriate and ultimately, direct him toward developing the skills he is lacking. Teaching outdoor education is a complex task involving several factors, monitoring interventions are a strategy outdoor educator trainers should consider in their efforts to help emerging outdoor educators hone a complex set of skills to effectively and safely teach in the outdoors.

To Devi Rose and Joan Schumann, Ph.D.

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CHAPTER I

INTRODUCTION

In the present era of outcome assessment and accountability, self-efficacy is a popular outcome measure in outdoor and adventure education (e.g., Davis-Berman & Berman, 1994; Hattie, Marsh, Neill, & Richards, 1997; Paxton & McAvoy, 1998; Jones & Hinton, 2007). Self-efficacy beliefs are context specific perceptions an individual possesses about a likelihood of success in future tasks (Bandura, 1986) and are related to well-being (Bunting, 2000), confidence (Propst & Kessler, 1998), and persistence (Pajares, 1997). Historically, and with few exceptions (cf. Sibthorp, 2003), the development of self-efficacy beliefs from participation in outdoor education is viewed as a positive and desirable outcome (e.g., Kimbrough, 2007).

However, recent research findings in applied psychology and human performance refute the traditional view that more is better, when it comes to self-efficacy beliefs. Specifically, findings indicate that these beliefs can be inaccurate and can easily become inflated (Schmidt & DeShon, 2009) resulting in decreases in motivation and performance (Moore & Chang, 2009; Vancouver & Kendall, 2006; Yeo & Neal, 2006). These findings clearly demonstrate that in some contexts “efficacy-enhancing interventions should be approached with caution” (Schmidt & DeShon, 2009, p. 201). Outdoor and adventure-based education is one such context to avoid the inflation of self-efficacy beliefs due to the physical

and educational consequences associated with failure (e.g., psychological harm, injury, or death; Martin & Priest, 1986). As such, the research contained within the present dissertation attempts to investigate, measure, and improve the accuracy of self-efficacy beliefs in outdoor education.

The following dissertation is in the form of three distinct papers (Chapters 2, 3, and 4). Although each paper is distinct from the others, similar themes exist amongst them because they are all exploring the same construct of interest, self-efficacy beliefs, and more specifically, the accuracy of those beliefs in outdoor education. Chapter 2, “The Illusion of Competence: Inaccurate Self-Efficacy in Outdoor Leaders” broadly examines the accuracy of self-efficacy beliefs from a theoretical perspective, identifies potential sources of inaccurate self-efficacy beliefs present in outdoor leadership training, and offers strategies to intervene and develop more accurate beliefs. Self-efficacy beliefs are developed as a result of four sources, the most influential source being self-assessments of previous performances (also known as enactive attainments; Bandura, 1986, 2001). Unfortunately, outdoor education experiences may contain several pedagogic approaches or conditions which inadequately inform participants’ self-assessments of performance. The sources in outdoor education which potentially contribute to illusions of competence (cf. Bjork, 1994) include the overprovision of success, isolated lessons of instruction, and inadequately processed experiences. In essence, these sources create conditions which fail to provide an accurate index for self-assessments and subsequently, accurate self-efficacy beliefs.

Chapter 2 in the present dissertation concludes with suggested strategies to ensure the accuracy of outdoor leaders’ self-efficacy beliefs such as providing a balance of opportunity for failure and success, combining skills in lessons to accurately represent future

contexts of application, and the adaption of components in metacognitive monitoring interventions (e.g., Hacker, Bol, Horgan, & Rakow, 2000; Nietfeld, Cao, & Osborn, 2006).

Chapter 3, “The Development and Scaling of the Teaching Outdoor Education Self-Efficacy Scale”, focuses on the measurement of a specific self-efficacy belief: outdoor educator *teaching self-efficacy beliefs*. Teacher self-efficacy beliefs in traditional classroom-based contexts have received considerable research attention; however, the scales for measurement in these contexts (e.g., The Ohio State Teacher Efficacy Scale; Tschannen-Moran & Hoy, 2001) are not applicable to outdoor education because assessment of self-efficacy beliefs without context specificity may actually be assessment of different constructs (Hensen, 2002). Therefore, a necessary step prior to improving the accuracy of teacher self-efficacy beliefs in outdoor education (article 3) was the development of a context-specific Teaching Outdoor Education Self-Efficacy Scale (TOE-SES). Chapter 3 involved two studies addressing scale development and scale validation.

Development of this scale broadly follows DeVillis’ (2003) guidelines for scale development and specifically attends to Bandura’s (2006) suggestions for self-efficacy scale development. Teaching outdoor education self-efficacy domains were identified through examination and consideration of various sources including the recommended outdoor leadership competencies identified by the Wilderness Education Association (Pelchat & Williams, 2009), the teacher qualification criteria from the Council of Chief State School Officers (CCSSO, 2010), outdoor education related research (e.g., Schumann, Paisley, Sibthorp, & Gookin, 2009) and literature (e.g., Gilbertson, et al., 2006; Gookin, 2003; Martin, Cashel, Wagstaff, & Breunig, 2006), and informal interviews with current outdoor educators and staffing directors. Ultimately, seven domains were identified that are relevant

to outdoor educator self-efficacy. These domains included instructional planning and assessment, instructional strategies, student engagement, outdoor classroom management, technical skill, interpersonal skill, and environmental integration. Items for each domain were developed, a factor structure was identified, and finally a proposed model fit was tested using confirmatory factor analysis. The scale developed from the research studies in Chapter 3 was used in Chapter 4.

Chapter 4 in this dissertation is titled, “Improving the Accuracy of Emerging Outdoor Educator’s Teaching Self-Efficacy Beliefs through a Metacognitive Monitoring Intervention.” In general, self-efficacy beliefs are concerned with what people believe they can do with their skills and abilities amidst uncertain conditions, ambiguous information, or unpredictable circumstances (Maddux & Gosselin, 2003); these conditions are analogous to the settings in which outdoor education often occurs (Martin, et al., 2004). Though no research exists on the accuracy of outdoor educator teacher self-efficacy beliefs, research findings on traditional classroom-based teaching self-efficacy beliefs indicate they tend to be overestimations of competence when compared to instructor judgments of students’ competence (Cakir & Alici, 2009; Mulholland & Wallace, 2001).

Consider the influence of outdoor educator’s inaccurate self-efficacy beliefs: an instructor who has inaccurately high teaching self-efficacy beliefs might experiment with teaching technical outdoor skills in new ways which, extend beyond the instructors ability to manage risk (cf. Allinder, 1994); or misinformed by inflated teaching self-efficacy beliefs, he may be harmfully persistent in facilitating group discussion despite difficulties such as student readiness or lack of emotional safety (cf. Tschannen-Moran, Hoy, & Hoy, 1998). Furthermore, attention should be paid to the development of these beliefs in the initial phases

of teacher training because teaching self-efficacy beliefs are malleable in the early stages of skill development and become fairly stable and resistant to change once established (Bandura, 1986). Pajares and Kranzler (1995) observed incongruence in individuals' self-efficacy beliefs and competence and suggested a need for instructional interventions which increase student's ability to calibrate the accuracy of their self-efficacy beliefs with their performance. Metacognitive monitoring interventions are one such approach (e.g., Nietfeld, Cao, & Osborn, 2006).

Metacognition (Flavell, 1979) is a cognitive process which allows an individual to understand their cognitive strengths, weaknesses, and competence (or incompetence). Monitoring interventions are exercises which can develop metacognition, improve performance, and have lasting effects on participants' accuracy of self-assessments and subsequent self-efficacy beliefs (Nietfeld, Cao, & Osborn, 2006). The final study in this dissertation demonstrates application of the components of monitoring interventions to the context of outdoor educator training.

Study participants participated in monitoring exercises over the progression of an outdoor educator training course. Participants predicted their performance (a self-efficacy belief) in teaching a topic, self-assessed that performance, and compared the accuracy of their predictions and self-assessments to an expert evaluation of their performance. Through the repeated processor noting the content and direction of any inaccuracies (over or underestimations) in self-efficacy beliefs and self-assessments, the intent was that the outdoor educator-in-training would integrate this information to better calibrate future self-appraisals.

At the conclusion of the treatment the accuracy the outdoor educators' teaching self-efficacy beliefs were compared between the treatment group and the control group (no monitoring exercises). This research is the culmination of three chapters examining the development, measurement, and improvement of, the accuracy of self-efficacy beliefs in outdoor education.

“The call for effective educators who teach in and about the outdoors in steadily increasing” (Gilbertson, Bates, McLaughlin, & Ewert, 2006, p. vii). However, if the field of outdoor education intends to answer this call, every effort should be made to ensure that the training of outdoor educators produces the appropriate outcomes. Current practices in outdoor education need to be reconsidered in order to avoid the undesired outcome of inaccurate self-efficacy beliefs. A scale is specifically needed to measure outdoor educator teaching self-efficacy beliefs and intervention to improve the accuracy of these beliefs is warranted. The following chapters address these needs in the effort to improve outdoor educators' understandings of their strengths and weaknesses, thereby allowing them to more fully and safely teach in the outdoors.

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CHAPTER II

THE ILLUSION OF COMPETENCE: INCREASING SELF-EFFICACY IN OUTDOOR LEADERS

Abstract

The development of self-efficacy from participation in adventure education is consistently viewed as a positive and desirable outcome. However, recent research (e.g., Schmidt & DeShon, 2009) outside the field of outdoor leadership and adventure education has called into question the assumption of a consistently positive relationship between increased self-efficacy and subsequent behavior. In some cases, self-efficacy beliefs can be overinflated and result in inappropriate selection of behaviors, acceptance of risk, and decreased performance. This has particular relevance for outdoor leaders because inaccurate or inflated efficacy beliefs carry dire consequences in outdoor settings (Martin & Priest, 1985). Several conditions present in outdoor leadership training may contribute to inflated or inaccurate self-efficacy beliefs. These include the overprovision of success, isolated lessons of instruction, and inadequately processed experiences. Each of these conditions represents a source for inaccurate self-assessments which contribute to inaccurate self-efficacy beliefs and potentially, detrimental outdoor leadership behaviors. Solutions to the conditions which create outdoor leaders' illusions of competence (cf., Bjork, 1994) include providing a balance

of opportunity for failure and success, combining skills in lessons to accurately represent future contexts of application, and the adaptation of metacognitive monitoring interventions.

Introduction

In an era of outcome assessment and accountability, self-efficacy is a popular outcome measure in outdoor leadership and adventure education (Davis-Berman & Berman, 1989, 1994; Hattie, Marsh, Neill, & Richards, 1997; Jones & Hinton, 2007; Paxton & McAvoy, 1998; Sibthorp, 2003). The development of self-efficacy from participation in adventure education is consistently viewed as a positive and desirable outcome (e.g., Kimbrough, 2007). However, recent research outside the field of outdoor leadership and adventure education has called into question the assumption of a consistently positive relationship between increased self-efficacy and subsequent behavior (e.g., Schmidt & DeShon, 2009). In some cases, self-efficacy beliefs can be overinflated and result in inappropriate selection of behaviors, acceptance of risk, and decreased performance. In addition, several pedagogic approaches present in outdoor leadership training may contribute to inflated or inaccurate (i.e., overestimated or underestimated) self-efficacy beliefs. Thus, the purpose of this paper is to examine the importance of accurate self-efficacy beliefs in outdoor leaders, identify the sources of inaccurate efficacy beliefs present in outdoor leadership training, and offer strategies to intervene and develop more accurate beliefs.

“Efficacy beliefs are the foundation of human agency” (Bandura, 2001, p.10). Self-efficacy beliefs influence the challenges individuals choose to undertake in similar settings in which the beliefs were developed (Pajares, 1997, 2008), as well as, influence thoughts and

behaviors beyond the original contexts (Paxton & McAvoy, 1998).¹ Specifically, self-efficacy beliefs are concerned with what people believe they can do with their skills and abilities amidst conditions where circumstances are uncertain, ambiguous, or unpredictable (Maddux & Gosselin, 2003). Outdoor leadership contexts commonly possess these conditions of uncertainty, ambiguity, and unpredictability thus, making self-efficacy beliefs particularly important. In essence, self-efficacy beliefs are future-oriented perceptions of competence that influence the approach or avoidance of tasks amidst uncertainty (Bandura, 1986).

Self-Efficacy in Outdoor Leadership

Considering the influence of self-efficacy beliefs on behavior, it is not surprising that outdoor leadership and adventure-based researchers have paid significant attention to their development. Sibthorp (2003) notes the congruencies between efficacy belief development and adventure education models “make an adventure experience ideal for self-efficacy development” (p. 88). Findings from Hattie, Marsh, Neill, and Richards’ (1997) meta-analysis indicated significant positive effects on the development of self-efficacy from participation in adventure and outdoor leadership programs. Bunting (2000) contends that increases in self-efficacy from participation in adventure-based programs contribute to psychological well-being and subsequently, overall health. It is generally accepted that self-efficacy gains in one adventure-based setting will translate into a similar adventure-based

¹ Behavior is certainly influenced by a multitude of factors reaching beyond Bandura’s (1977, 2001) social cognitive theory. A useful conceptualization of this complex web of variables can be found in the theory of planned behavior (Ajzen, 1991). Self-efficacy is but one of the constructs present in the theory, other salient influences include perceived behavioral control, locus of control, and normative beliefs. In addition, constructs not addressed by Ajzen but that have been considered important to behavioral decisions include those referred to as controlled, automated, and cognitive processes (Chaiken & Trope, 1999).

settings (Propst & Koesler, 1998). For example, perceptions of paddling competence in one setting may influence perceptions of paddling competence in another setting. Nearly unanimously, authors of adventure-based literature view the development of self-efficacy beliefs as positive and desirable (e.g., Kimbrough, 2007). In light of this view, there is a substantial dearth of adventure-based research regarding either the accuracy in the development of self-efficacy beliefs or the subsequent benefits of increased self-efficacy beliefs in the outdoor leadership context. A lone exception comes from Sibthorp (2003) who warns, “Increased self-efficacy is far from a panacea” (p. 88).

Accuracy of Self-Efficacy Beliefs

The accuracy of self-efficacy beliefs is critical in the outdoor leadership context. Outdoor leader self-efficacy beliefs, which are overestimations or underestimations of a likelihood of success, carry consequences for student safety and learning. For example, a leader may be presented with an opportunity to lead a group across technical mountain terrain; if her self-efficacy beliefs are *overestimations* of her likelihood to succeed, she may risk student safety and the possible consequences include injury or death (Martin & Priest, 1985; Priest, 1993). Between 1951 and 2007, overestimation of one’s ability was the second most common contributing factor to the number of climbing accidents (905) in the United States; the first was climbing unroped, arguably another overestimation of ability (American Alpine Club, 2009). Conversely, if the outdoor leader *underestimates* her likelihood of success and avoids the challenge (i.e., technical terrain) she may deprive the students of a learning opportunity to experience safe travel on technical ground.

The consequences of inaccurate efficacy beliefs are not exclusive to the technical aspects of outdoor leadership. Regarding facilitation, processing, or teaching, a leader may need to assess her competence and predict the likelihood that she can effectively debrief a failed summit attempt or teach strategies to resolve conflict (Priest & Gass, 2007).

Overinflated efficacy beliefs may cause the leader to attempt facilitating a discussion beyond her ability, possibly resulting in psychological damage to her participants. Conversely, she may underestimate her competence in the future task, avoid processing the event, and fail to provide a valuable learning opportunity. In sum, the accuracy of self-efficacy beliefs is an important consideration amidst the myriad of tasks an effective outdoor leader must perform.

Though no research has been conducted in outdoor leadership or adventure education on the topic, authors in educational and applied Psychology have recently explored the importance of accurate self-efficacy beliefs, examined the consequences of inflated beliefs, and identified a cause for inaccurate beliefs. Historically, research findings have found the conventional positive relationship between self-efficacy and performance when examined statistically between persons (i.e., relating overall self-efficacy of all participants, to overall performance of all participants); however, a negative relationship is observed when examining the within person variance over time (i.e., comparing an individual to themselves over several performances; Richard, Diefendorff, & Martin, 2006; Vancouver & Kendall, 2006; Vancouver, Thompson, Tischner, & Putka, 2002; Vancouver, Thompson, & Williams, 2001; Yeo & Neal, 2006). Simply stated, the overall positive relationship was overshadowing negative relationships for some individuals; increases in efficacy did not always indicate increases in performance. Vancouver and colleagues (2001, 2002) found increases in self-efficacy can eventually exert a progressively smaller and potentially

negative influence on performance. The authors explain that high self-efficacy beliefs can translate to overconfidence, complacency, and inaccurate perceptions of progress towards a goal; the result is a decrease in resource allocation, motivation, and performance. Vancouver et al.'s findings came under considerable criticism (e.g., Bandura & Locke, 2003); however, the results have been critically examined and replicated by other researchers (Moore & Cha-Jan Chang, 2009; Schmidt & Deshon, 2009; Yeo & Neal, 2006).

In general, recent research findings refute the adage “more is better” in the context of self-efficacy beliefs. Schmidt & DeShon (2009) found that “following poor or substandard performance, self-efficacy was positively related to subsequent performance. However, following more successful prior performances, *self-efficacy was negatively related to subsequent performance* [italics added]” (p. 198). For a significant amount of participants, as self-efficacy increased, performance actually decreased. Interestingly, the authors observed the relationship between self-efficacy and subsequent performance was moderated by the degree of prior success.

Recent findings point to the importance of continual self-assessment of competence in the effort to avoid the over-inflation of efficacy-beliefs (Moore & Cha-Jan Chang, 2009; Schmidt & DeShon, 2009). This is consistent with Bandura (1977, 1986) who explains, of the four sources contributing to the development of efficacy beliefs, *self-assessments* of past performances are the largest contributing factor. It should further be noted, efficacy beliefs are formed based on self-assessments of performance regardless of their accuracy. For example, if an outdoor leader makes an assessment of competently climbing a rock face, though he was assisted up the crux by his belayer, the resulting inaccurate self-assessment of performance may translate to an inflated self-efficacy belief.

Outdoor leadership is a context to avoid the inflation of efficacy beliefs due to the physical and educational consequences associated with failure. Where conditions are controlled and risk is managed, failure can be instructive (Nicolazzo, 2004), yet in other conditions, failure can result in physical and psychological damage (Martin & Priest, 1985). Outdoor leadership training programs which intend to develop outdoor leaders should pay particular attention to the *accuracy of self-assessments* in order keep outdoor leader self-efficacy beliefs and subsequent behaviors in check.

Accuracy of Self-Assessments

Individuals generally overrate themselves compared to their actual knowledge or behavior. No research to date has been conducted on the accuracy of self-assessments in outdoor leadership or adventure education contexts; however, the accuracy of self-assessment has received substantial attention in related fields such as, human performance and education (e.g., Dunning, Heath, & Suls, 2004). Unfortunately, individual's notions of their skill and cognitive capacity often do not correlate with their performance (Bjork, 1994, 1999; Dunning, Johnson, Ehrlinger, & Kruger, 2003). For example, students' ratings of their academic skills in the first year of college only correlate at .35 with their instructors evaluations of student skill (Chemers, Hu, & Garcia, 2001), people's views of their intelligence correlates less than .3 with performance on intelligence tests (Hansford & Hattie, 1982), and in situations where feedback or standards might not be readily available (e.g., leadership competence or interpersonal skills) correlations are less than .18 (Mabe & West, 1982).

Dunning et al. (2004) illustrate the importance of accurate self-assessment and the resultant behaviors by noting:

To the degree that people judge themselves accurately, they make decisions, big and small, that lead to better lives. However, to the extent that people misjudge themselves, they may suffer costly consequences by pursuing wrong paths and missing opportunities to take advantage of special skills and resources they truly own... at times the consequences of flawed self-assessment can be severe, as in the case of the novice airplane pilot who thinks he can take off into fog without his flight instructor's supervision. (p. 70)

Furthermore, the consequences of inaccurate self-assessment, self-efficacy beliefs, and behaviors are not constrained to the self. For example, an outdoor leader too assured of her ability to build a climbing anchor exposes other climbers to risks that might be life threatening. The accuracy of efficacy beliefs and the corresponding appropriateness of the subsequent choices an outdoor leader makes hinges upon the accuracy of her self-assessments (Bandura, 1986; Winne & Hadwinn, 1988). Thus, outdoor leadership training is a context in which the accuracy of self-assessment should be a priority and self-efficacy-enhancement should be approached with caution.

Sources of Inaccurate Self-Efficacy Beliefs in

Outdoor Leadership Training

One of the many goals of outdoor leadership programs is to train outdoor leaders in a variety of technical and interpersonal skills and develop a leader's "ability to accurately self-assess" (Pelchat & Williams, 2009, p. 36). It is useful to attend to self-assessment accuracy and self-efficacy beliefs in the early stages of outdoor leader self-efficacy development. Self-efficacy beliefs are malleable early on due to the limited number of prior self-assessments (Bandura, 1986). Accordingly, because the number of self-assessments increases over an

outdoor leader's career self-efficacy beliefs become fairly stable and resistant to change once established.

Paradoxically, several mechanisms present in adventure education and outdoor leadership programs may lead to outdoor leaders' inaccurate self-assessments and subsequently, inaccurate self-efficacy beliefs. As such, the following will bring particular attention to sources which contribute to the proximal outcome of inaccurate self-assessment because of the contribution self-assessment has upon the distal outcome of self-efficacy beliefs. It should be noted however, various participant, trait-based psychological sources of inaccurate self-assessments are incidentally "brought" to outdoor leadership programs. For example, attributional style (Graham & Weiner, 1996) is a dispositional tendency for people to attribute the causes of success or failure to themselves (e.g., "I am a skilled") or circumstances outside themselves (e.g., "the rock was wet" or "the sun was in my eyes"). Though not the focus of this paper, it is important to remember that such dispositional sources of inaccurate self-assessment are thought to be relatively stable and likely to exist amidst the following programmatic sources of inaccurate self-assessment.

The Provision of Success

A potential source of inaccurate self-assessments resulting in inaccurate self-efficacy beliefs which is present in outdoor leadership training is the provision of success. Bjork (1994) points out the importance of introducing difficulties to the learner in order to make the experience a more accurate index for assessment. In essence, too much success and not enough opportunity for error might mislead the learner into an illusion of competence. The author goes on to explain that failures more effectively inform the learner of future

conditions of practice and give a more comprehensive perspective of ability and limits.

McKenzie's (2000) review of how adventure education program outcomes are achieved also emphasizes the importance of building *a balance* of success and failure into activities and programs. Nonetheless, it seems that the adventure-based and outdoor leadership literature possesses a considerable bias towards success.

Walsh and Golins (1976) devote particular time describing the steps necessary to maximize the students' *potential for success*. Kimball and Bacon (1993) explain that adventure education activities are typically "structured so that success and mastery are not only possible, but probable" (p. 21). Lastly, Bisson (1998) conducted a comprehensive examination of sequencing in adventure education and categorized the final stage of sequenced adventure activities as "group achievement" (p. 210). Perhaps at first glance, the provision of success would seem to be a preferred strategy resulting in increased confidence, esteem, and efficacy; however as noted earlier the unchecked development of self-efficacy beliefs specifically in the context of outdoor leadership has been drawn into question.

Is it possible that a "benevolent" outdoor leadership instructor, intending to develop future outdoor leaders' confidence, might provide a disproportioned number of opportunities for success? For example, in the process of teaching orienteering an instructor may repeatedly choose locations with easily identifiable topographic features (i.e., defined ridgelines, deep valleys, and clearly defined summits). Each time, the students quickly develop an understanding of the relationship of the map to the field. Success comes relatively easily, perhaps too easily. Subsequently, the outdoor leadership students may be provided a "challenge" to apply their orienteering skills and navigate through mountainous terrain toward an open meadow in a valley below. In reality, the contours of the terrain make

it difficult to miss the meadow. After arrival in the meadow, based upon their success, the students might assess themselves as competent in orienteering. However, the repeated provision of success failed to provide information on the limits of their skill, may contribute to illusions of competence in their ability (Bjork, 1994), and contribute to inflated self-efficacy beliefs.

Isolated Lessons of Instruction

Sometimes referred to as massed training (Glenberg, 1979), this approach involves isolating each skill and training them individually, as opposed to intermingling the skills in an effort to more accurately represent the context to which the skill will be transferred. Simon and Bjork (2001) found that individuals who learned skills in an intense block of instruction which did not accurately represent the complex nature of the tasks in the real context were significantly outperformed by the groups who learned the task in an environment which more accurately represented the transfer context. The isolated skill group actually learned the skill faster but consistently made more *overly optimistic predictions* of their subsequent performance. Dunning et al. (2003b) aptly explained this error by noting, “Short-term excellence is mistaken for long term competence” (p. 87).

Several examples of this approach are apparent in current adventure-based texts (Drury, Bonney, Berman, & Wagstaff, 2005; Stremba & Bisson, 2009; Wagstaff & Attarian, 2009). In a chapter on sea kayak skill development Holden (2009) provides a single intense lesson to teach an “eskimo bow rescue.” Whilst in calm water, the paddler intentionally flips her boat upside down, waits, and moves her hands back and forth along her hull, while another boater brings his bow to the side of the capsized boat, finally, she reaches up to grab

the bow and rights herself without exiting the kayak cockpit. The author's follow-up activity is to perform this task again at an unannounced time in a protected area. Though the follow-up is nearing an accurate representation of the real context it is only until the participant is required to perform in the real context that she will have accurate information to base her self-assessment upon. Anyone who has experienced success learning the similar skill of an Eskimo roll in a pool understands this misperception of ability when they attempt their first Eskimo roll in actual surf. Without subsequent practice in real conditions the participant may falsely believe she has the competence in this skill (Wilde, 1998). The result may be misinformed skill-efficacy beliefs leading her to subsequently believe she can perform this skill if necessary in a leadership context.

Processing of Experiences

Processing of experiences is an inherent component in the training of outdoor leaders which may contribute to inaccurate self-assessments and subsequent self-efficacy beliefs. Any model of experiential or adventure-based education contains the essential element of experience (e.g., Kolb, 1984; McKenzie, 2003; Walsh & Golins, 1976). Outdoor leaders-in-training are provided experiences, from which they can learn, grow and develop understandings of themselves and the world around them (Hunt, 1999). Sugerman, Doherty, Garvey, and Gass (2000) define processing as a cognitive process where people recapture their experience, think about it, mull it over, and evaluate it. Often times, it is not possible to formally process every experience, or by intention, some experiences are left to the participant to make meaning from independently; this is known as letting the experience speak for itself (Gass & Stevens, 2007). In addition, debriefing without sufficient

frontloading has been found to inadequately inform or assist participants in making meaning from experiences (Paisley, Sibthorp, & Jorgenson, 2006). These mechanisms leave the onus on the student to make sense of her experience, assess her competence, and develop self-efficacy beliefs with limited or inaccurate information.

Some participants, in fact, come more equipped than others to accurately self-assess their experiences. Research findings have shown that individuals in the lower performing quartiles of ability ranges consistently overestimate their performance (Hodges, Regehr, & Martin, 2001; Kruger & Dunning, 1999). For example, performers of debates have been shown to consistently overestimate if they were winning a debate and they were just as likely to inaccurately evaluate who was winning debates they were not participating in. This phenomenon has been demonstrated in a variety of contexts including test taking, medical skills, and laboratory technicians (for a review, see Erhlinger, et al., 2008). One hypothesis regarding the lower quartile's consistent lack of self-assessment accuracy is that persons in this range possess the least amount of ability, and correspondingly, lack the knowledge of what adequate performance is. Simply stated, these individuals are unskilled and unaware despite performance feedback amidst their experience (Kruger & Dunning, 1999).

In the context of outdoor leadership training, a student may be asked to facilitate the process of problem solving for an important group decision (e.g., to set up camp rather than continue on late into the night to reach a food cache). The leader-in-training might meagerly facilitate a solution: he neglects to comprehensively gather information about the route, fails to see viable alternatives, and weights his own desires heavier than his peers'. Ultimately he facilitates a decision to continue on towards the cache. Due to the lateness in the day, upon reaching the cache, the course instructor might direct attention towards other tasks such as

establishing camp. The following morning may be too hectic reorganizing food and gear to fully process the evening's events. By default, the leader-in-training is left to process the experience independently. As a novice, the student lacks an understanding of the complexity and multiphasic nature of problem solving and decision-making (i.e., Priest & Gass, 2005) yet, based on what seemed to be the achievement of a decision, the student may assess himself as competent in problem solving and decision-making. The result may be a future outdoor leader with an inadequately informed self-assessment and overestimated self-efficacy beliefs.

Though accurate self-assessment is a desired goal of outdoor leadership trainings, programmatic efforts such as the provision of success, isolated instructional lessons, and poorly or unguided processing of experiences might contribute to inaccurate self-assessments leading to inaccurate self-efficacy beliefs and inappropriate behaviors in outdoor leadership. Further, those who possess inflated self-efficacy beliefs pose a particular danger to themselves and those they lead in the outdoors.

Strategies to Develop Accurate Self-Efficacy Beliefs

Balanced Provision of Opportunity for Failure and Success

The intentional provision of opportunities for both failure and success may be a viable solution to limit the development of inaccurate outdoor leader self-efficacy beliefs. Nicolazzo's (2004) site management theory provides a concept for application of such an approach in outdoor leadership training: "stationary sites" (p. 12). Stationary sites are those which can be limited by physical boundaries (such as a top roped-climbing site or the bottom of a rapid), hazards can be identified and minimized by the instructors, instructors can stop

all action at a moment's notice, and students can be "tested to failure" (p. 13). Although the original application of site management is intended to provide *instructors* with an opportunity to assess their students' skill, the use of stationary sites also provides the student (i.e., an outdoor leader-in-training) an opportunity to experience the limits of his competence.

An example of providing a balance of between opportunities for failure and success in a stationary site may be as simple as setting up a rock climbing site which contains routes all students can climb and also routes beyond their abilities. Additional examples might include allowing an outdoor leader-in-training to become "lost" while attempting to lead a group of students in a simulated leadership experience or allow the leader-in-training to fail in facilitating the decision-making process *and* experience the consequences (e.g., group frustration or conflict) without intervention from the instructor. The opportunity for "natural consequences" is one of the assets of outdoor and adventure-based education; however, how often are they intentionally utilized? In exchange for developing confidence, opportunities for failure might be unnecessarily limited. Authentic experiences with consequences provide a genuine opportunity for failure and self-assessment of competence. Although the concept of stationary sites is primarily applied to technical skills (e.g., paddling, route-finding) where risk can be sufficiently managed for failure to occur, application of the concept to non-technical contexts (e.g., interpersonal or leadership) may be equally as beneficial.

Combining Skills to Accurately Represent Future Context

Training outdoor leaders in conditions which accurately represent the complexity of the context where skills will be transferred may also reduce the likelihood of inaccurate self-efficacy beliefs. In order for learners to gain an accurate sense of their competence in a

particular skill they must be subjected to the conditions in which they will later be required to perform (Simon & Bjork, 2001). Of course, this is not always possible in the outdoor leadership context for a variety of reasons such as time constraints or risk management. Quite often, time constraints do not allow for an outdoor leadership student to practice all of their skills in a variety of realistic contexts. This is to no fault of the leadership training; however, students should be provided information regarding where their skills are at on a continuum upon completion of a course. Did the course end at an introductory level? Are their skills relatively advanced in relation to the challenges in the field? Regarding risk management, no instructor would think it is appropriate to capsize an outdoor leader-in-training's canoe above a real, life threatening, unmanageable hazard in order to create a more accurate training environment. However, when possible, and after students have developed proficiency in basic skills, allowing them to integrate all of the skills may help to more adequately inform them of their competence.

Ensuring that risk can be managed (e.g., a stationary site; Nicolazzo, 2004), an outdoor leadership course instructor may choose to combine several skills into a single practice session, rather than leaving previously taught skills isolated (as discussed earlier). For example, students may be provided an opportunity to test their abilities in a gauntlet-style challenge. Utilizing a scouted section of whitewater, with accessible eddies and rescuers positioned with throw bags, a student may be allowed to paddle the rapid, intentionally capsize, attempt a "combat roll," wet exit the kayak, aggressively swim towards the river bank, and conclude with attempting to surmount a partially submerged log (which is set up on a quick-release in the event of failure to vault over the log). Combining these skills in a

safe environment allows the outdoor leader-in-training to understand how difficult the individual tasks become when they are combined.

A non-technical illustration of combining skills could take place in the effort to teach leaders-in-training how to provide feedback. A common practice in outdoor leadership training is the leader-of-the-day (LOD) experience, in which a student is asked to lead her peers throughout an entire day; debriefing the LOD at the conclusion of the day is often a way for students to develop their skills at providing feedback (Gookin, 2003). However, providing feedback in an isolated instance at the conclusion of the day does not sufficiently represent the context in which students will provide feedback when they become leaders. An approach which more accurately represents the subsequent conditions leaders might operate in, could involve providing feedback throughout the day. An instructor might assign two students to provide formative feedback to the LOD during the day, in addition to summative feedback at the conclusion of their peer's LOD experience. This approach would require the students to employ interpersonal skills as they navigate their relationship with a leader-of-the-day, select appropriate times to provide feedback, select the most salient pieces of information to provide, and structure the feedback in a manner which is accessible. Thus, combining skills and creating an integrated context provides future outdoor leaders with an accurate index to base self-assessments of competence and self-efficacy beliefs upon.

Metacognitive Monitoring Interventions

Metacognitive Monitoring Interventions (MMIs) are a strategy which can assist in the interpretation and processing of experiences through a series of actions focused on developing an awareness of performance and competence. These interventions can be

considered highly structured forms of processing. By intention, the issue of inadequate processing of experiences is the final solution addressed in this paper because, even if the previous strategies are employed, some outdoor leaders-in-training may still fail to accurately self-assess their competence. For this reason, metacognitive monitoring interventions will be described in greater detail due to their potential to more deeply and comprehensively develop accurate self-efficacy beliefs.

Paul Petzoldt, the founder of the National Outdoor Leadership School (NOLS) and the Wilderness Education Association (WEA), was well known for telling his students “know what you know and what you don’t know” (Wagstaff, 2005, p. 6). The notion of knowledge about the knowledge and skills an outdoor leader possesses is known to psychologists as metacognition (Flavell, 1979). It is the act of having a thought about one’s own thinking or cognitive abilities. Metacognition has particular relevance in outdoor leadership contexts because leaders are required to not only perform physical tasks (e.g., climbing or paddling) but also cognitive tasks or metaskills such as problem solving, decision making, or teaching (Gookin, 2003; Priest & Gass, 2005). Metacognition pertains specifically to the cognitive processes required to accurately assess one’s current state of knowledge and cognitive ability. Essentially, metacognition is thinking about what you know and are cognitively capable of.

An example in the context of outdoor leadership might clarify the concept of metacognition. Imagine a leader is selecting a location for a river crossing. She must assess her ability to successfully orchestrate the crossing. She will need to select an appropriate location (e.g., river flow, depth, and consequences), manage environmental considerations (e.g., hypothermia), manage the group, and select an appropriate strategy (a dry crossing on a

log or a wet crossing in the water). She surmises she has had difficulty managing this particular group under stressful circumstances. Previously, she noticed she had neglected the technical aspects in front of her, in exchange for managing the easily-distracted group of participants. She decides that the wet crossing will be too complex of a cognitive task for her to manage, potentially requiring multiple people in the water at once amidst technical rope work. She opts to continue downstream and finds a suitable crossing on a log, which, she believes is within her capacity to manage.

It should be noted that this example is not a purely metacognitive act, per se, due to the monitoring of external stimuli (how strong is the current, how high is the river, etc...). However, the scenario demonstrates the influence of metacognition; the leader's assessment of her cognitive capacity (i.e., she could not manage the group amidst technical challenge). Ultimately, this influenced her behavior to continue downstream toward a manageable river crossing. She knew what she was, and was not, capable of doing and this influenced her leadership behavior.

Metacognition can be developed through metacognitive monitoring interventions (Hacker, Bol, Bahbani, 2008). Furthermore, these interventions have been shown to successfully reduce inaccurate self-assessments, increase performance, and *influence the development of accurate self-efficacy beliefs* (Nietfield, Cao, & Osborn, 2006).

Metacognitive monitoring interventions can effectively minimize the overestimation of ability in lower quartile performers (Kruger & Dunning, 1999). This evidence points to the utility of a monitoring intervention in outdoor leadership training where the experience is often allowed to “speak for itself” or is perhaps insufficiently debriefed and participants are

left to their own cognitive capacities to make meaning and self-assessments (e.g., Sugerman, et al. 2000).

Though, typically, conducted in the context of purely cognitive tasks, the application of the components of metacognitive monitoring interventions may improve the accuracy of self-efficacy beliefs in outdoor leadership skills containing both cognitive and physical tasks.

In a sense, the following example is simply a monitoring intervention with metacognitive characteristics intending to influence various domains of self-assessment (e.g., cognitive and physical) and ultimately, self-efficacy beliefs. Readers of this application might see similarities to current practices (e.g., Gookin, 2003); however, the process described below involves not only feedback after an individual's performance but also involves feedback on the accuracy of a student's own prediction of performance, accuracy of a student's post-performance evaluation (postdiction), provides a format for identification of areas needing further development, and provides an incentive for the accuracy of self-assessment. Utilization of these components has been found to create durable changes in individuals' accuracy of self-assessments (Thiede, Anderson, & Therriault, 2003).

A monitoring intervention to increase outdoor leaders' accuracy of self-assessments and resulting self-efficacy beliefs can take place amidst an outdoor leadership training course. Beginning prior to a specific leadership opportunity (e.g., teaching a skill or leading an activity) the leader-in-training could be asked to predict her performance using a rubric for the task. The prediction of her own performance represents her self-efficacy belief in the task. At the conclusion of her leadership experience, she would evaluate her performance on the rubric again. In addition, the instructors complete the rubric evaluating her performance. Subsequently, the leader-in-training compares her prediction of her performance and post-

performance self-assessment to the instructor completed form of the rubric.² The process of comparing predictions and self-assessments to an objective assessment provides information for the participant to understand how well her self-efficacy beliefs, are calibrated (i.e., are they over or underestimated?) and provide information to ensure that the student's self-assessment of the experience is accurate which will translate to future self-efficacy beliefs. Lastly, an incentive to accurately self-assess her performance could be provided by tying the accuracy of the student's predictions and self-assessments to a point system which contributes to the student's final evaluation or grade for the course (Hacker, et al., 2008; Schraw, et al., 1993).

In addition to the information on the accuracy of her prediction and self-assessment, a guided reflective process serves to supplement the leader's understanding of areas of strength and those needing improvement. Using the instructor completed rubric, the participant could be guided through a reflection (via journaling prompts) to identify areas where her performance in the skill is strong or needs further development, identify specific strategies for improvement, and importantly, take note of discrepancies between her self-assessments and the objective score. This journal could be debriefed with an instructor to clarify or assist in the monitoring process.

This process should be repeated throughout an outdoor leadership course allowing time for the intervention to have a durable influence on the participant (Hacker, et al., 2000). The current practice of debriefing participants and allowing feedback from their peers can, and should still occur, as these practices have value for the group process.

² Perhaps the crux in the application of these interventions from traditional settings to outdoor leadership is the provision of objective evaluation. Previous interventions have provided feedback from performance on knowledge tests in which assessment of performance was unambiguous, that is, whether or not she provided the correct response to a question. A two-pronged solution to this issue is the development of valid rubrics for evaluation of performance and the creation of a composite score from several sources such as, each of the course instructors.

The above monitoring intervention has the potential to create durable changes in the participant's ability to accurately self-assess (Nietfeld, et al., 2006). Over time, the participant would be able to observe how well her self-assessment is calibrated, make appropriate adjustments, and apply this new knowledge in future outdoor leadership experiences. The result, for example, is an outdoor leader who can more accurately judge his likelihood of success in facilitating delicate discussion or teaching a difficult technical skill. Further, based on a new understanding of his competencies, he may more effectively manage his time and chose to practice the skills needing further development (Tobias & Everson, 2009).

Conclusion

The importance of accurate self-efficacy beliefs in outdoor leadership cannot be overstated. Perceptions of one's likelihood of success influence the challenges we choose to approach and avoid (Bandura, 1986, 1977; Winne & Hadwinn, 1988). At times, self-efficacy beliefs can be inflated or inaccurate and result in decreases in motivation and performance. However, the literature in adventure education and outdoor leadership training has neglected to recognize the importance of accurate self-efficacy beliefs. Instead, outdoor leadership and adventure-based literature contains a consistently positive view towards the increase of participants' self-efficacy beliefs. Yet, due to physical and psychological consequences, outdoor leadership is a setting in which self-efficacy-enhancement should be approached with caution.

The most influential source of efficacy belief development is self-assessments. The accuracy of outdoor leaders' self-assessments influences the accuracy of the subsequent self-

efficacy beliefs. Unfortunately, the presence of inaccurate self-assessment is prevalent in society and likely present in outdoor leaders. However, several programmatic aspects of outdoor leadership training such as the provision of success, isolated skill instruction, and inadequate processing may contribute to self-assessment inaccuracies and in turn, inaccurate self-efficacy beliefs.

Several solutions to minimize inaccurate self-efficacy beliefs in outdoor leadership training exist. Application of the stationary site concept (Nicolazzo, 2004) is a possible strategy to balance the provision of opportunities for success and failure. Through combination of these experiences students are able to gain valuable information regarding the limits of their abilities. Secondly, combining skills to more accurately represent the later contexts of skill application may provide students with a more complete index for self-efficacy belief development. Lastly, an intentionally designed monitoring intervention which informs outdoor leaders of the accuracy of their self-efficacy beliefs and self-assessments may be a useful strategy for training outdoor leaders. Ultimately, implementation of these strategies may help to avoid inaccurate increases in self-efficacy beliefs thereby, reducing outdoor leaders' illusions of competence and allowing them to more fully and safely, lead others in the outdoors.

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CHAPTER 3

THE DEVELOPMENT AND SCALING OF THE TEACHING OUTDOOR EDUCATION SELF-EFFICACY SCALE

Abstract

Outdoor educator *teaching self-efficacy beliefs* are important to the process of teaching in the outdoors. Errors in these self-beliefs, which are one's judgments of ability to successfully perform necessary teaching tasks, carry consequences for student learning and safety in outdoor contexts. Despite the importance of attending to teaching self-efficacy beliefs, no scale exists to measure them. The present paper presents two studies conducted in order to develop a teaching outdoor education self-efficacy scale (TOE-SES). In Study 1, data were collected from 303 participants in undergraduate collegiate outdoor programs across the United States. Exploratory factor analysis reduced a 49-item pool to a parsimonious 23 item scale comprised of 5 subscales: instruction and assessment (IA), outdoor classroom management (OCM), technical skill (TECH), interpersonal skill (INT), and environmental integration (ENV). In Study 2, data were collected from 200 National Outdoor Leadership School (NOLS) instructor and outdoor educator course participants. Confirmatory factor analysis tested the fit of the proposed model from Study 1. Results indicated an acceptable fit for a 22-item, 5-factor scale with strong subscale internal

consistencies. Due to the dire consequences associated with inaccurate teaching self-efficacy beliefs in outdoor contexts, the TOE-SES 22 was developed as a means to examine the accuracy of these influential self-beliefs.

Introduction

Outdoor educator *teacher self-efficacy beliefs* are important to the process of teaching in the outdoors. Specifically, an outdoor educator's self-efficacy beliefs may influence the approach and avoidance of instructional strategies, the likelihood to experiment with new strategies (Allinder, 1994), and persistence amidst set-backs while teaching (Tschannen-Moran, Hoy, & Hoy, 1998). An effective outdoor educator must not only be competent in the foundational skills required to teach in traditional, classroom-based settings (e.g., engage students, differentiate instruction, and assess student performance), he or she must also be competent in outdoor-specific teaching skills (Gilbertson, Bates, McLaughlin, & Ewert, 2006, p. vii). For example, an outdoor educator who is teaching students how to kayak on a whitewater river may need to maintain her students' physical comfort in challenging environmental conditions (e.g., hot sun, wind, rain, or snow), gain students' trust amidst actual physical hazards, improvise instructional techniques amidst minimal resources (e.g., draw in the sand rather than on a chalkboard or overhead projector), minimize impacts to the environment, and select a river-based "classroom" to ensure a balance of risk management and opportunities for student learning. Thus, errors in an educator's self-efficacy beliefs, which are one's judgments of ability to successfully perform necessary teaching tasks, carry consequences for student learning and student safety (cf. Martin & Priest, 1986).

Self-efficacy beliefs are considered the “foundation of human agency” (Bandura, 2001, p.10). They are beliefs in “one’s capabilities to organize and execute the courses of action required to produce given attainments” (Bandura, 1977, p. 3). Essentially, self-efficacy beliefs are future-oriented beliefs about one’s likelihood of success in accomplishing a task. Their influence on behavior, and more specifically teacher behaviors, is well documented in the form of teacher self-efficacy beliefs (Tschannen, et al., 1998). An important distinction is that self-efficacy beliefs reflect *perceptions* or judgments of competence and these judgments may often be over or underestimations of an individual’s actual ability (Cakir & Alici, 2009; Woolfolk Hoy & Burke-Spero, 2005). In addition, self-efficacy beliefs are generally considered context and task-specific (Bandura, 1986; Propst & Koesler, 1998). Pajares (1997) notes that when evaluation of one’s capability is matched to a specific task in a specific setting the self-efficacy judgments are most likely to predict behaviors related to persistence, motivation, and approach or avoidance of tasks. Despite the uniqueness of outdoor education tasks and the consequences associated with inaccurate outdoor educator teaching self-efficacy beliefs, there is no instrument available to accurately measure those beliefs. Thus, the final purpose of the two studies presented in this paper is to develop and validate a self-efficacy scale specific to teaching in outdoor education contexts.

A self-efficacy scale for outdoor education would provide valuable information to outdoor educator trainers and outdoor educators-in-training. The scale could inform trainers regarding how accurate an educator-in-training’s perception of competence is. Does he fail to recognize his strengths and limitations? Will he be safe? Will he approach tasks beyond his ability or unnecessarily avoid teaching challenges which he can surmount? Similarly, an outdoor educator-in-training might gain valuable information about the domains of skill

where she is over or underestimating her likelihood of success and subsequently utilize this knowledge to avoid undesirable consequences such as injury (cf. Martin & Priest, 1986) or take full advantage of her skills and maximize student learning.

The importance of examining outdoor educator self-efficacy during the training phase is emphasized by research findings which indicate unrealistically positive or negative self-efficacy beliefs are commonly found to develop in teachers when they first begin the teaching process (Cakir & Alici, 2009). These initial experiences are the some of the most powerful influences on long-term teacher self-efficacy beliefs and future behaviors (Shaughnessy, 2004).

Teacher Self-Efficacy: A Brief History of the Construct and Measurement

Teacher self-efficacy has been found to predict teachers' goals and aspirations (Mujis & Reynolds, 2002), the likelihood of experimenting with teaching strategies (Allinder, 1994), and persistence in the face of set-backs (Tschannen-Moran, et al., 1998). It should be noted however, that statements about the influence of teacher self-efficacy (or as it was initially termed, teacher efficacy) should be interpreted with caution due to a historical litany of measurement issues. Despite this caveat, the above findings are of particular relevance for the application of teacher self-efficacy in outdoor education.

Although there is no instrumentation for outdoor educator self-efficacy; there has been considerable attention directed toward teacher self-efficacy in the traditional classroom-based context. Unfortunately, the varieties of approaches taken by researchers to understand teacher self-efficacy have made it an elusive construct to capture (Tschannen-Moran & Hoy, 2001). For example, the construct teacher *self*-efficacy was not initially being examined, but

rather, the broad construct teacher efficacy was being measured (Armor, et al. 1976). Teacher efficacy was defined as a teacher's judgment of her abilities to bring about the outcomes of student engagement and learning, even in difficult or unmotivated students (Armor, et al., 1976; Bandura, 1977). The lack of "self" in the term "teacher efficacy" and its definition directs the meaning (and measurement) towards the effectiveness a teacher might have on outcomes rather than the teacher's ability to perform specific tasks. The operationalization of teacher efficacy resulted in measuring constructs distinctly different from teacher *self*-efficacy including locus of control (Rotter, 1966) and outcome expectancies (Bandura, 1986; Tschannen-Moran & Hoy, 2001). The distinction between a self-efficacy belief and outcome expectancy is noted by Tschannen-Moran, et al. (1998) who explain that beliefs about whether a teacher can perform certain actions (teacher self-efficacy) is a much different conceptualization than beliefs about whether actions will effect general outcomes (outcome expectancy). As such, and for subsequent clarity, the present study will use the term teacher self-efficacy or when appropriate, teaching outdoor education self-efficacy.

Recent efforts to examine teacher self-efficacy come from the theoretical traditions of Bandura's work (1977, 1997) with an added emphasis on context and task specificity. Skaalvik and Skaalvik (2007) offer a useful instrument to capture teacher self-efficacy which recognizes the importance of context and tasks in a variety of domains associated within teacher's daily lives. Adaptation and extension of this approach to the outdoor education setting may be a useful strategy to develop a self-efficacy scale for outdoor education.

Domains of Teaching Outdoor Education Self-Efficacy

In an effort to direct the development of the Teaching Outdoor Education Self-Efficacy Scale (TOE-SES), teaching outdoor education self-efficacy is defined as an educator's belief in his or her capability to organize and execute the courses of action required to successfully accomplish teaching tasks in outdoor education settings. An analysis of the skills required of outdoor educators was necessary to develop an outdoor education-specific scale. However, unlike traditional education, outdoor education is a generally unregulated field, lacking in federal or state recommended competencies. Therefore, several sources were examined in both the traditional and outdoor education contexts to create an inventory of relevant domains and competencies.

Examination of teacher qualification criteria as established by the Council of Chief State School Officers (CCSSO) allowed for easily accessible and identifiable competencies which may be relevant for outdoor educators. These competencies include instructional planning, instructional strategies, possessing content knowledge, differentiating instruction for diverse learners, engaging students, assessing student learning, and developing rapport with students (CCSSO, 2010). These competencies or ability domains serve as a useful starting point, yet they may fail to capture the necessary context and multidimensional nature of outdoor education practice.

The Wilderness Education Association (WEA) has recently developed accreditation standards in accordance with the US Department of Education (Pelchat & Williams, 2009) in an effort to establish federally recognized competencies for outdoor leadership training. The competencies include: outdoor living, planning and logistics, risk management, leadership, environmental integration, and lastly, education. Several subcomponents of the "education"

(p. 37) competency are consistent with those identified by CCSSO (2010). Planning and assessment, instructional strategies, and student engagement appear to be three domains which are germane to the teaching trade regardless of context and thus, are included in the TOE-SES.

Comparison of the WEA competencies with other sources describing the nature of outdoor education practice produced four more competencies relevant for inclusion. Outdoor education related research (e.g., Schumann, Paisley, Sibthorp, & Gookin, 2009) and texts (e.g. Gilbertson, et al., 2006; Gookin, 2003; Martin, Cashel, Wagstaff, & Breunig, 2006) contain recommendations for areas in which outdoor educators should be competent. In addition, practitioners themselves function as a source because various strategies known as “folk pedagogies” (Baldwin, Persing, & Magnuson, 2004, p. 168) are utilized but receive little attention in the literature. The following additional domains of competence were developed: outdoor classroom management (Priest & Gass, 2005; Wagstaff & Attarian, 2009), technical skill (e.g., Shooter, Paisley, Sibthorp, 2009; Wagstaff & Attarian, 2009), interpersonal skill (McKenzie, 2003; Schumann, et al., 2009; Shooter, et al., 2009), and environmental integration (Martin, et al., 2006).

Ultimately, after examination of (a) CCSSO recommended competencies, (b) the WEA competencies, (c) outdoor education related research and literature, and (d) informal interviews with current outdoor educators and staffing supervisors seven domains were identified which appear to be relevant to outdoor educator self-efficacy beliefs. The following is a description of each domain.

Instructional Planning and Assessment

Instructional planning and assessment is the ability to appropriately select, plan, and prepare activities and lessons based upon assessment of students' needs or abilities and also assess student performance in subsequently delivered lessons and activities. Preparing to teach in the outdoors is an important skill. Effective outdoor educators need to “do their homework” (Gookin, 2003, p. 12) before the activity to ensure they have an adequate knowledge base to teach from. Gookin explains, “A teacher generally needs to know 5 – 10 times as much detail as is taught to be considered proficient enough to teach the topic” (p. 12). In addition to developing content knowledge, the educator must be able to assess the current ability and comfort level of her students in order to select an appropriate level of challenge and outdoor location for instruction (Nicolazzo, 2004; Priest & Gass, 2005) as well as assess student performance. A sample item for instructional planning and assessment is as follows: “Use several different assessment techniques to enhance your knowledge of students' progress.”

Implementation of Instructional Strategies

Implementation of instructional strategies refers to an ability to effectively *deliver* teaching strategies to demographically diverse students of all abilities. Just because an instructor knows how to perform a skill does not mean he knows how to teach it. In some cases, competent outdoor educators are required to analyze a task, break it down into its components, and then provide effective instruction to convey tasks through various means such as verbal, visual, and kinesthetic approaches (Wagstaff & Attarian, 2009). Despite the lack of traditional teaching resources in an outdoor setting, outdoor educators must still

utilize sound practices such as the use of visual aids. This may require creating, and effectively using, an improvised whiteboard (e.g., conceptual drawings in the sand). At other times, skills are taught through direct instruction (Gookin, 2003) and outdoor educators may need to competently use the instructional strategy of feedback (e.g., Schumann, et.al., 2009) to inform students of their progress. A sample item is as follows: “Provide feedback to all of your students regardless of their ability?”

Student Engagement and Motivation

Student engagement is the ability to gain and maintain student interest in learning and generate a motivation to continue the learning process. Instructors who are engaging can effectively use their voice, energy level, and body language to maintain student interest through a lesson (Gookin, 2003). They can engage students through providing choice and making material relevant to the students’ interests (Jensen, 1998). A sample item is as follows: “Use a variety of strategies to engage even the least motivated students during a long day of outdoor activity?”

Outdoor “Classroom” Management

Outdoor classroom management refers to the ability to effectively teach in the natural environment while managing students’ physical comfort and managing risk to the participants. The outdoor education environment provides a resource rich classroom for teachers to interact with, yet it also presents a variety of conditions which must be managed for student safety and learning. Outdoor educators are required to select educational experiences appropriate to the environmental conditions (Priest & Gass, 2005, p. 115). Outdoor educators are also required to teach in contexts which potentially contain dangerous

objective hazards such as rock fall, avalanche danger, or lightning (Wagstaff & Attarian, 2009). A sample item is: “Monitor each of your students’ physical comfort and protection from the environment (extreme temperatures, wind, rain...)?”

Technical Skill

The technical skill domain refers to the ability to successfully and safely perform the necessary outdoor skills relevant to accomplishing a particular lesson or activity. “Technical skills are the physical tasks associated with the hands-on activities of outdoor education” (Shooter, Sibthorp, & Paisley, 2009, p. 7). Although technical skills are not always the intended outcome of outdoor education they commonly serve as the means through which the outcomes are achieved (Priest & Gass, 2005). These skills include outdoor recreation activities such as rock climbing or paddling. This goes beyond simply knowing about the skill, it addresses the ability to do it. An educator who cannot model skills such as rolling a kayak, crampon technique, or route finding is a less effective instructor than one who possesses the necessary skills. An item from the technical skill domain is as follows: “Accurately use a map and compass to determine your location¹?”

Interpersonal Skill

The interpersonal skill domain refers to the ability to build rapport, effectively listen, understand, empathize, demonstrate sincerity, and show respect for student differences in culture, interests, and skill. The importance of outdoor educators to competently communicate and connect with students on a personal level is well documented in the literature (e.g., McKenzie, 2003). To achieve desired outcomes an educator must be able to

¹Items in the technical skill domain should be modified as necessary to suit the context in which the outdoor education training or field work occurs (e.g., sea kayak specific skills, desert skills).

communicate with students in ways that place value on student opinions, encourage participation, and clearly convey ideas. More specifically, communication skills are used by educators to build rapport with students. Instructor rapport is predictive of several outcomes in National Outdoor Leadership School curriculum (i.e., leadership, outdoor skill, environmental stewardship; Sibthorp, Paisley, & Gookin, 2007). Lastly, outdoor education is a social endeavor and educators must be able to adapt these strategies to recognize cultural differences as well as differences in student ability (Gilbertson, et al., 2006). A sample item is as follows: “Communicate with your students in ways that demonstrate sensitivity to cultural differences?”

Environmental Integration

Environmental integration refers to an outdoor educator’s ability to effectively address ecological considerations throughout his or her educational practice in the effort to develop students’ environmental ethic and connections to the environment. Introducing students to local flora and fauna, facilitating discussion around ecological concepts, and bringing to light environmental impacts resulting from land use and management are all foundational aspects of outdoor education (Gookin, 2003; Martin, et al., 2006; Pelchat & Williams, 2009;). A sample item is as follows: “Integrate current land management issues into your daily lessons?”

Methods - Study 1

Design

DeVillis’s (2003) guidelines for scale development and Bandura’s (2006) recommendations for self-efficacy scale development were followed in order to develop the

present scale. TOE-SES items include the use of “you” because the purpose is to assess the educator’s subjective belief in his ability. They also include verbs such as, “can” or “are able to” so that the items point to the successful attainment of the task. Items attend to self-efficacy strength, which is the degree of confidence in a respondent’s ability to perform in a domain (i.e., 0 - 100% certain; Bandura, 2006). In addition, Bandura recommends examining generality, which refers to the breadth of the domain. Finding the optimal level of breadth and specificity does not come without its challenges. Items extremely specific would come at the “expense of external validity and practical relevance” (Pajares, 1997, p. 561). In an effort to achieve context specificity and breadth, each of the items are situated in outdoor education across the seven domains, yet remain general enough to ensure the present instrument’s utility across the outdoor education self-efficacy construct. As such each item will be in response to the prompt: “How certain you are that you can *currently* perform the following tasks throughout a week-long wilderness backpacking expedition with ten students?”²

Content Validity

Based on the above scale design and identification of teaching outdoor education domains, 49 items were developed for the initial item pool. Content validity was maximized through use of an expert panel comprised of outdoor education program researchers, field staff and curriculum directors across a variety of programs (e.g., Outward Bound USA, The National Outdoor Leadership School, and the Wilderness Education Association). Panel members first examined the domains and confirmed or disconfirmed the definitions, the

²This prompt can be modified by users of the TOE-SES to suit different outdoor education contexts where trainings or field work occurs (e.g., How certain you are that you can *currently* perform the following tasks throughout a week-long *sea-kayaking* expedition with ten students?)

comprehensiveness of the domains, and offered additional domains if necessary. Expert panel members then examined each item for clarity and assigned each item in the initial pool to one of the seven domains. Recommendations for improvement were offered and taken into consideration. The seven original domains remained and where appropriate, items were rewritten.

Measurement

The target scale length for the final version of the TOE-SES was approximately 25 items. After efforts to improve content validity were taken, an initial pool of 49 items was developed which consisted of 8 items in the instructional planning and assessment domain, 11 items in the instructional strategies domain, 5 in the outdoor classroom management domain, 7 in the technical skill domain, 6 in the interpersonal domain, 5 in the student engagement domain, and 7 in the environmental integration domain. The questionnaire also contained demographic information regarding number of weeks of field experience as an outdoor educator (a week is 7 days), gender, and age.

Setting and Participants

The 49-item scale was administered to undergraduates in collegiate outdoor programs across the United States ($n = 303$). Due to the outdoor educational emphasis of these programs, participants familiarity with item content, and that the participants are generally at the beginning of their outdoor educator careers, they were well situated to participate in the development of the scale. Given the target scale length of approximately 25 items, the sample size was adequate (Tabachnick & Fidell, 2001) and consisted of 99 females (32%) and 204

males (68%). The mean age was 23 years (SD 4.57), the mean number of weeks of outdoor educator experience was 12 (SD 25.2).

Data Analysis

The objectives were to produce seven distinct subscales to represent the breadth of outdoor educator teaching self-efficacy beliefs, with alpha coefficients above .80 through a 25 item multidimensional scale. Because this was an exploratory instrument, preliminary statistical evaluation of the suitability of the scale for factor analysis was conducted as recommended by Tabachnick and Fidell (2001). To reduce the scale items, a series of principal-axis factor analyses were conducted, each followed by direct oblim rotation solutions because it was anticipated that the underlying subscales would be correlated. In addition, subscale item analysis was conducted as per Devillis (2003) using means, standard deviations, interitem correlations, content validity feedback, and discrimination statistics. Items were deleted based on low squared multiple correlations, followed by low item-scale correlations.

Results - Study 1

The suitability of the scale for factor analysis was acceptable with a Kaiser-Meyer-Olkin (KMO) sampling adequacy statistic of .938 and a significant Bartlett's test of sphericity < .001. The initial factor analysis was performed on the 49-item instrument with forced extraction of the hypothesized seven factors. The analysis revealed seven factors with eigenvalues exceeding 1.0. After examination of the scree plot and indicators of factor and item viability, it was decided that a five-factor solution was the most interpretable. Several items in the instructional planning and assessment subscale, instructional strategies subscale,

and the student engagement subscale loaded onto the same factor, thus resulting in a single factor we identified as instruction and assessment (IA) defined as the ability to effectively prepare and implement teaching strategies, gain and maintain a diverse group of students' interests, and assess student performance.

In order to identify the final subscale items, a series of principal axis analyses were used. An item was considered for inclusion on the final scale if it had a structure matrix loading of greater than .45 on a given factor (Tabachnick & Fidell, 2001) and satisfied the item characteristics recommended by DeVillis (2003). Ultimately, after item deletion, a 23-item multidimensional scale was identified (Teaching Outdoor Education Self-Efficacy Scale, TOE-SES 23) which explained 58.26% of the variance with satisfactory subscale internal consistencies. The TOE-SES 23 contained five subscales: instruction and assessment (IA, $\alpha = .90$), technical skill (TECH, $\alpha = .81$), interpersonal skill (INT, $\alpha = .82$), outdoor classroom management (OCM, $\alpha = .83$), and environmental integration (ENV, $\alpha = .88$). The factorial structure did not exhibit a notable difference when analyzed separately by male and female participants. Table 3.1 presents a pattern matrix for the factor loadings of the final solution. A factor correlation matrix is presented in Table 3.2.

Methods - Study 2

Measurement

The primary purpose of Study 2 was to examine the validity of the five subscales of the TOE-SES 23 through confirmatory factor analysis. Convergent validity was also assessed through four additional items from Skaalvik and Skaalvik's (2007) teacher self-efficacy (TSE) scale which examines teacher self-efficacy beliefs in traditional classroom-based

Table 3.1. Pattern Matrix of Final Solution of the 5 Factor
Principal Axis Factor Analysis with Oblim Rotation

Item	IA	Sub-Scale			
		TECH	INT	OCM	ENV
Be prepared to explain subject matter in several distinctly different ways to your students.	.57				
Create lessons that meet the needs of a diversity of learners.	.79				
Accurately assess each student's performance.	.59				
Facilitate discussion in a variety of ways.	.48				
Adapt your instruction to attend to the spectrum of abilities in your group.	.55				
Use teaching strategies that address different learning preferences.	.58				
Introduce topics in creative ways that are engaging for your students.	.49				
Accurately monitor each of your students' protection from the environment.				.50	
Select appropriate outdoor instructional sites to maximize student challenge while managing risk.				.52	
Adapt your instruction based on changes in the hazards present in your outdoor classroom.				.63	
Effectively manage instructional time so that students basic needs are met (food, shelter, rest...).				.54	
Facilitate discussion surrounding ecological concepts.					.46
Interpret the basic health of environmental systems.					.64
Deliver lessons to inform students of local flora and fauna.					.75
Integrate current land management issues into your daily lessons.					.77
Without error, demonstrate how to use a map and compass.		.80			
Appropriately adjust travel plans due to changes in environmental conditions.		.67			
Demonstrate how to conduct a patient assessment of an individual who has been injured by rock fall.		.45			

Table 3.1. Continued

Item	Sub-Scale				
	IA	TECH	INT	OCM	ENV
Communicate with your students in ways that demonstrate sensitivity to cultural differences.			.54		
Communicate empathy for each of your students.			.75		
Communicate patience with your students after a long day of difficult weather.			.70		
Communicate with your students in ways that demonstrate sensitivity to gender differences.			.77		
Alpha coefficient	.90	.81	.82	.83	.88

Note: $N = 303$. Total variance explained by all factors was 58.26%.

Table 3.2. Factor Correlation Matrix ($N = 303$)

	IA	TECH	INT	OCM	ENV
IA	1.00				
TECH	.42	1.00			
INT	.57	.28	1.00		
OCM	.47	.51	.39	1.00	
ENV	.32	.37	.37	.31	1.00

settings. It was hypothesized that the TSE items would be positively correlated with the TOE-SES 23 subscales. The total questionnaire, as administered, consisted of 23 TOE-SES items, 4 TSE items, 2 demographic items (sex and age) and 1 item regarding field weeks employed as an outdoor educator.

Setting and Participants

The scale was administered to National Outdoor Leadership School (NOLS) participants on Outdoor Educator and Instructor Courses in 2011. Established in 1965, NOLS combines the development of outdoor leadership, education, and technical skills with disciplines such as biology and natural history. Students on outdoor educator and instructor courses typically aspire to work professionally in outdoor education and are in the process of gaining further skill development. Two hundred participants ($n = 200$) completed the instrument which was an adequate sample size for this model (Boosma, 1983). Of the sample, 112 were male (56%) and 88 were female (44%), mean age was 24.8 years (SD 6.43), mean number of field weeks was 12.79 weeks (SD 28.8). This sample was comparable to the sample in Study 1.

Data Analysis

A confirmatory factor analysis (CFA) tested the fit of the proposed model from study 1. The CFA utilized AMOS 4.0 (Arbuckle & Wothke, 1999) structural equation modeling software. The hypothesized model of the TOE-SES 23 was tested using a maximum likelihood estimation of the five distinct, yet correlated, latent variables. In order to recognize the covariance structures, error terms on adjacent items on the same subscale were allowed to correlate if covariances were above .1.

Hu and Bentler (1995) suggest reporting two types of fit indices, a residual fit index and a comparative fit index. The goodness-of-fit index (GFI) was used as an indicator of absolute fit. The optimal value for not rejecting correct models is about .91 in a sample of 200 (Sivo, Fan, Witta, & Willse, 2006). The root mean square error of approximation (RMSEA) was used to compare the model's lack of fit compared to a perfect model; Browne and Cudeck (1993) explain that RMSEA value of .08 or less would indicate a reasonable error of approximation and models between .05 and .08 represent an acceptable fit. The root mean square residual (RMR) was used as a residual-based fit index, models with an RMR value of zero indicate a perfect fit, the smaller the RMR the better. Because of its sensitivity to small sample sizes, Bollen's (1990) incremental-fit index (IFI) was used as an indicator of type two incremental fit ($>.95 = \text{good fit}$). As suggested by Hu and Bentler (1999), the comparative-fit index (CFI) was also used due to its sensitivity to small samples ($>.95 = \text{good fit}$). It is also recommended to examine the path coefficients; factor loadings should exceed .70 so that items are explained more by the hypothesized reflective construct than by the associated error (Tabachnick & Fidell, 2001). In addition, the appropriateness of any post hoc

modification of the resultant model were considered based on Tabachnik and Fidell's (2001) suggested use of the Akaike Information Criterion (AIC). Finally, a summative score was created for the traditional classroom-based TSE scale (Skaalvik & Skaalvik, 2007) and the five TOE-SES 23 subscales; it was hypothesized that TOE-SES and TSE scores would be positively related.

Study 2 – Results

Initial examination of the path coefficients and modification indices identified one potentially problematic item in the interpersonal skill subscale. The item loaded across three of the subscales. Upon inspection, retention of the item was not warranted due to sufficient content coverage by other items and the item was removed from further analyses. The resultant model, the TOE-SES 22, was tested. In general, based on examination of the fit indices and path coefficients, the results indicated that the TOE-SES 22 model exhibited an acceptable fit. Indices which are sensitive to smaller sample sizes, demonstrated a good to excellent fit and provided support for the proposed factor structure of the TOE-SES 22: RMSEA = .069, IFI = .959; CFI = .958. The GFI was .862 which is approaching the cutoff for a good model fit of .91 with this sample size. The RMR was .152, indicating marginal fit. Path coefficients were also examined. All standardized regression coefficients of the items on their respective domain subscales were significant ($p < .001$). Excluding one item in the technical skill domain subscale (...demonstrate how to conduct a patient assessment), all item weights were above .7. Post hoc modification of the base model from a scale of 23 items to 22 items resulted in an AIC decrease from 620.56 to 498.588 reflecting a considerable and appropriate improvement from modification. Thus, considering the results of the fit and

modification indices and regression weight characteristics it appears that TOE-SES 22 factor structure is acceptable.

Factor correlations ranged from .54 to .90. The TECH and OCM factors were the most highly correlated at .90. A path coefficient so high is indicative of multicollinearity, implying that the two domains of TECH and OCM may be empirically inseparable even though they might be conceptually different.

In comparison to the exploratory factor analysis in Study 1, the refined factor analyzed model in study two demonstrated superior internal consistency across the subscales. The TOE-SES 22 accounted for 74.60% of the variance and displayed strong internal consistency across the five distinct subscales: IA ($\alpha = .94$), OCM ($\alpha = .92$), TECH ($\alpha = .86$), INT ($\alpha = .92$), and ENV ($\alpha = .93$). The results of the confirmatory factor analysis are presented in Figure 3.1.

Convergent validity was evidenced by the hypothesized positive correlations between each of the TOE-SES 22 subscales and the traditional classroom-based teacher self-efficacy scale (TSE; Skaalvik & Skaalvik, 2007). All correlations were significant at the $p < .01$ level, correlations between subscales are presented in Table 3.3. The instruction and assessment (IA) subscale correlated the most highly with the TSE (.74); these subscale items were likely the most similar to one another because they addressed aspects of instruction that are germane to teaching regardless of context. The environmental integration (ENV) subscale correlated the least with the TSE (.56); which seems appropriate because items in the ENV subscale may represent some of the teaching tasks most unique to outdoor education practice.

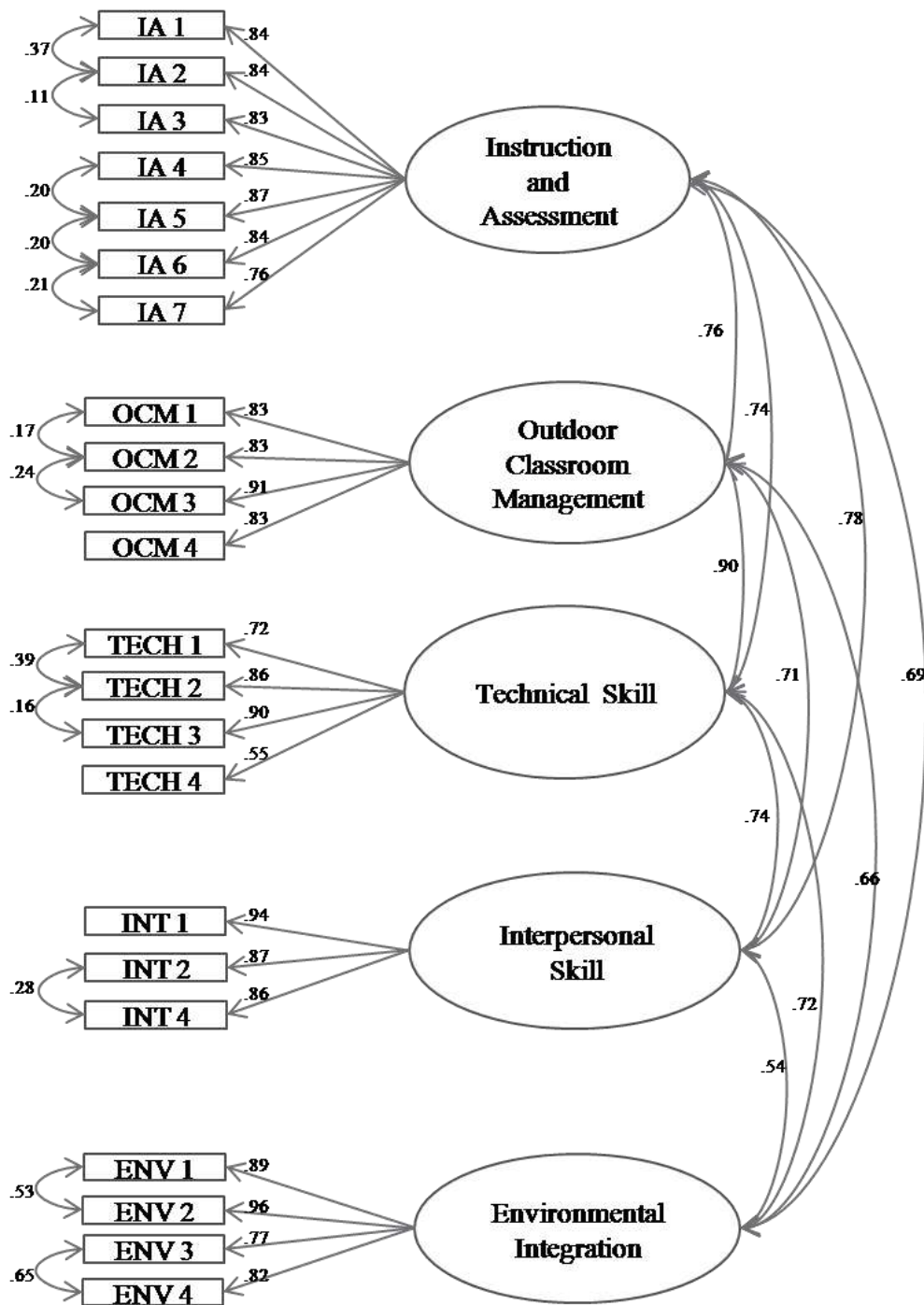


Figure 3.1. Confirmatory Factor Analytic Model for the TOE-SES 22

Table 3.3. Correlation Between Subscales ($N = 200$)

	IA	OCM	TECH	INT	ENV	TSE
IA	1.00					
OCM	.72*	1.00				
TECH	.62*	.78*	1.00			
INT	.73*	.65*	.57*	1.00		
ENV	.65*	.64*	.67*	.45*	1.00	
TSE	.74*	.66*	.62*	.62*	.56*	1.00

Note. $N = 200$

IA = Instruction and Assessment, OCM = Outdoor Classroom Management, TECH = Technical Skill, INT = Interpersonal Skill, ENV = Environmental Integration, TSE = Teacher Self-Efficacy Scale (Skaalvik & Skaalvik, 2007)

*Correlation is significant at $p < .01$ (2-tailed)

Discussion and Conclusions

The purpose of this paper was to develop and validate an instrument to measure teaching outdoor education self-efficacy beliefs. Two studies were conducted to accomplish this goal: the first utilized exploratory factor analysis (EFA), the second involved confirmatory factor analysis (CFA). The final result of these analyses was the Teaching Outdoor Education Self-Efficacy Scale 22 (TOE-SES 22), a five-factored multidimensional scale with an acceptable model fit and sound subscale internal consistencies.

Study 1 examined the viability of seven discrete domains of outdoor education practice; the hypothesized domains were developed from outdoor and traditional education sources. Results indicated a 23-item, 5-factor structure was more appropriate. Empirically, an outdoor educator's beliefs about his or her likelihood of success in assessing students, planning and implementing instruction, and engaging students are closely related and may be considered a single skill domain. Although these domains of educational practice are parsed out in outdoor educational research and texts, it seems likely that proficiency in one domain

equates to proficiency in the others. Thus, the three domains of outdoor educational practice (instructional planning and assessment, instructional strategies, and student engagement) were collapsed into a single domain termed: instruction and assessment. Refinement in the initial stage of scale development retained the conceptual characteristics of outdoor education practice, yet improved the parsimony of the overall scale increasing its utility for future use.

In Study 2, a confirmatory factor analysis confirmed the factor structure of the hypothesized five distinct, yet correlated subscales of teaching outdoor education self-efficacy. The subscales included: (a) instruction and assessment, (b) outdoor classroom management, (c) technical skill, (d) interpersonal skill, and (e) environmental integration. Although, the results indicated an acceptable fit, there were indications that the model could be improved. Future researchers looking to improve the scale might consider examining the effect of additional items or perhaps reexamining the subscales and corresponding domains to ensure the latent construct of teaching outdoor education self-efficacy is comprehensively captured.

The relation between the TECH and OCM domains is of particular interest. The two subscales are conceptually different, yet empirically, appear to measure the same latent construct. The high correlation between the domains may be an artifact of the study population's relative inexperience as outdoor educators. A population of seasoned outdoor educators may be more likely to discern between the ability to perform a skill and the ability to teach others. Previous authors in outdoor education explain that technical skills are required for an outdoor educator to effectively manage a classroom in an environment with technical characteristics (e.g., avalanche terrain or whitewater). At the same time it is understood that the ability to demonstrate a skill (e.g., a technical river crossing) is *not*

equivalent to the ability to manage a classroom in which students are learning that skill. For example, because an outdoor educator can catch an eddy in class III whitewater does not necessarily indicate she can manage a site where students are learning how to do this skill (Nicolazzo, 2004). Therefore, to collapse the two domains into one might be empirically sound yet comprise the conceptual validity of the scale and the decision was made to retain the distinction.

Lastly, efforts to simply increase teaching self-efficacy beliefs and use the TOE-SES 22 for measurement would be remiss without attending to the accuracy of the beliefs. Particularly in outdoor education contexts, inaccurate teaching self-efficacy beliefs carry consequences for student learning and safety (cf. Martin & Priest, 1986). Outdoor educators' teaching self-efficacy beliefs can become inflated and in some cases, outdoor educator training programs inadvertently foster inflated beliefs of competence (Article 1). As such, teaching outdoor education self-efficacy beliefs should be compared to external objective assessments (e.g., staff trainer or supervisor evaluations). Herein lays the utility of the TOE-SES 22. Examination of the *accuracy* of TOE-SES 22 beliefs can provide useful feedback for emerging outdoor educators to calibrate their beliefs in their abilities and make appropriate educational decisions in the future.

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CHAPTER 4

IMPROVING THE ACCURACY OF EMERGING OUTDOOR EDUCATORS' TEACHING SELF-EFFICACY BELIEFS THROUGH A METACOGNITIVE INTERVENTION

Abstract

Accuracy in emerging outdoor educators' *teaching self-efficacy beliefs* is critical to student safety and learning. Historically, outdoor education programs and research have neglected the notion of accuracy, and viewed an *increase* in self-efficacy as an unequivocally positive outcome from participation in outdoor programs. Recent research however, refutes the common belief that when it comes to self-efficacy, more is always better. Although a slight overestimation may be beneficial, over-inflated self-efficacy beliefs can result in the inappropriate selection of behaviors, acceptance of risk, and ultimately failure. In an outdoor education context, neglecting the accuracy of teaching self-efficacy beliefs early in an outdoor educator's development may result in dire consequences. Metacognitive monitoring interventions are a possible approach to help emerging outdoor educators calibrate their teaching self-efficacy beliefs with their actual performances. Thus, the purpose of this study was to examine the effects of a monitoring intervention on the *accuracy* of outdoor educator teaching self-efficacy beliefs.

Results of this study indicate a monitoring intervention was able to significantly improve the accuracy of emerging outdoor educators' teaching self-efficacy beliefs. Educators-in-training who did not participate in the monitoring intervention appeared to consistently overestimate their likelihood of success across all domains of teaching outdoor education, thus demonstrating the need for interventions to help emerging outdoor educators calibrate their teaching self-efficacy beliefs. Implications for research and practice are discussed.

Introduction

Accuracy in emerging outdoor educators' *teaching self-efficacy beliefs* is critical to student safety and learning in outdoor education. An instructor with inflated teaching self-efficacy beliefs may overestimate his ability to safely teach whitewater kayak skills amidst river hazards and not only risk his own safety, but also the safety of his students. Similarly, an instructor who overestimates her ability to successfully facilitate conflict resolution may fail to choose effective strategies or understand the group dynamic and cause emotional or psychological damage. Research has shown that "inflated self-efficacy has led to the unwise escalation of commitment to a course of action...even if that action will result in a bad outcome" (Ng & Earl, 2008, p. 42). Teaching self-efficacy beliefs are malleable in the early stages of skill development and become fairly stable and resistant to change once established (Bandura, 1986). As such, neglecting to attend to the accuracy of teaching self-efficacy beliefs early in an outdoor educator's development can result in dire consequences in the context of an outdoor educator's practice (cf. Martin & Priest, 1985).

Historically, outdoor education programs and research have neglected the notion of accuracy, and viewed an *increase* in self-efficacy as a positive outcome from participation (Bunting, 2000, Hattie, Marsh, Niell, & Richards, 1997; Jones & Hinton, 2007; Kimbrough, 2007; Paxton & McAvoy, 1998; Propst & Koesler, 1998.). This one-dimensional perspective on self-efficacy seems appropriate considering increases in self-efficacy are related to well-being (Bunting, 2000), success, and confidence (Propst & Kessler, 1998). In addition, increases in self-efficacy have been found to influence motivation (Bandura, 1986), indicating that the more an individual believes she will be successful, the more she would persist toward achieving her desired goals.

Research asserts that a *slight* over estimation is acceptable because it may increase persistence; however, when self-efficacy beliefs become overinflated the consequences can be severe. When looking at the relationship between self-efficacy and performance of specific individuals (as opposed to overall group performance) increases in self-efficacy can actually cause a decrease in performance (Schmidt & Deshon, 2009; Vancouver, Thompson, Tischner, & Putka, 2002; Vancouver & Kendall, 2006; Yeo & Neal, 2006). This research refutes the common belief that, when it comes to self-efficacy, “more is always better.” In fact, self-efficacy beliefs can easily become overinflated and the result may be inappropriate selection of behaviors, acceptance of risk, and ultimately failure. Therefore, the purpose of this study is to examine the effect of an intervention to improve the *accuracy* of emerging outdoor educator’s teaching self-efficacy beliefs.

Teacher Self-Efficacy Beliefs

Grounded in Social Cognitive Theory, self-efficacy beliefs are considered the “foundation of human agency” (Bandura, 2001, p. 10). They are beliefs about one’s ability to “organize and execute the courses of action required to produce given attainments” (Bandura, 1977, p. 3). In essence, self-efficacy beliefs are future-oriented perceptions of competence that influence the approach or avoidance of tasks (Bandura, 1986). In the context of teaching, self-efficacy beliefs can direct educators’ behaviors and have been found to predict the level of teachers’ aspirations and goals (Mujis & Reynolds, 2002), their likelihood of experimenting with new teaching strategies (Allinder, 1994), and their persistence amidst setbacks (Tschannen-Moran, Woolfolk Hoy, & Hoy, 1998). “The idea that teachers’ self-beliefs are determinants of teaching behavior is a simple, yet powerful idea” (Henson, 2001, p. 4).

The importance of accurate outdoor educator teaching self-efficacy beliefs is substantial considering the consequences of inappropriate behaviors resulting from inaccurate beliefs. In general self-efficacy beliefs are concerned with what people believe they can do with their skills and abilities amidst uncertain conditions, ambiguous information, or unpredictable circumstances (Maddux & Gosselin, 2003); these conditions are analogous to the settings in which outdoor education often occurs (Martin, Cashel, Wagstaff, & Bruenig, 2004). Tschannen-Moran and Hoy (2007) explain teacher self-efficacy can direct teacher behaviors and also emphasize, “[self-efficacy] is based on a self-perception of competence rather than *actual* level of competence” (p. 946). As such, unchecked enhancement of outdoor educator self-efficacy beliefs should be approached with caution and

attendance to the accuracy of outdoor educator self-efficacy beliefs should be of utmost importance.

Formation and Accuracy of Teacher Self-Efficacy

Whether accurate or faulty, teacher self-efficacy beliefs are informed by four sources: (a) self-assessments of prior performances (known as enactive experiences), (b) verbal persuasion, (c) vicarious experience (watching the performance of others), and (d) physiological information (feelings of stress or calm during performance; Bandura, 1986). Research findings indicate self-assessments of prior teaching experiences are the most influential sources of development (Tschannen-Moran & Hoy, 2001). Self-assessments can be very problematic because generally, individuals' self assessments of performance are *overestimations* of actual performance (Dunning, Heath, & Suls 2004; Mabe & West, 1982). Overestimation of performance is very pronounced in novices (Dunning, et al. 2004) and likely present in outdoor educators-in-training because by definition, they are still relatively new to teaching in the outdoors and still in the initial phases of learning to teach in the outdoors.

Although no research has been conducted on the accuracy of preservice outdoor educators' self-efficacy beliefs, traditional classroom-based teachers-in-training self-efficacy beliefs have received attention in the literature. Research findings on traditional teachers-in-training self-efficacy beliefs and self-assessments indicate they both tend to be overestimations of actual competence and are less frequently underestimations or accurate estimations of competence when compared to instructor judgments of students' competence (Cakir & Alici, 2009; Mulholland & Wallace, 2001;). These findings are unfortunate

because teachers-in-training would benefit greatly from accurate self-assessments. Even more so, outdoor educators-in-training would benefit from accurate self-assessments because this would allow them to appropriately devote preparation time to develop skills they are lacking (cf. Thiede, Anderson, & Therriault, 2003; Wheatley, 2005), safely take advantage of their strengths in complex outdoor environments, and avoid undesirable outcomes for their students (e.g., injury, psychological damage).

One explanation for the prevalence of over-estimated self-assessments and self-efficacy beliefs is that those who are less skilled, are less able to differentiate what good and poor performances are (Krueger & Dunning, 1999). This phenomenon is most pronounced in the lower quartiles of skill ranges where individuals are not only incompetent; they appear to be unaware of their incompetence. In short, the less skill an individual has the less likely he is be able to know how much he does not know. The cognitive process which helps an individual understand their strengths, weaknesses, and competence is known as metacognition (Flavell, 1979).

The notion of metacognition is not new to the field of outdoor education. Paul Petzoldt, founder of the National Outdoor Leadership School used to say “know what you know and know what you don’t know” (Wagstaff, 2005, p. 6). Essentially, Petzoldt was talking about having a metacognitive awareness or knowing about what knowledge and abilities an individualthemselves possesses.

Paradoxically, the better one becomes at a skill the better he becomes at accurately assessing his own prior performance and predicting future performances (a self-efficacy belief). Generally, until this competence develops an individual is less capable of accurate self-assessments and will tend to overestimate his abilities (e.g., Hodges, Regehr, & Martin,

2001). Amidst this paradox, however, it is possible to help individuals calibrate the accuracy of their self-assessments and self-efficacy beliefs through exercises which encourage metacognitive processes. These exercises are known as monitoring interventions (e.g., Tobias & Everson, 2009).

Monitoring Interventions, Self-Efficacy, and Performance

Pajares and Kranzler (1995) observed incongruence in individuals' self-efficacy beliefs and competence and suggested a need for instructional interventions which increase students' abilities to *calibrate the accuracy of their self-efficacy beliefs with their actual performances*. Monitoring interventions may be an effective means of calibration in outdoor education contexts (Article 1). Monitoring interventions can improve performance and have lasting effects on participants' accuracy of self-assessments and subsequent self-efficacy beliefs (Nietfeld, Cao, & Osborn, 2006). Discussing the implications of their monitoring intervention, Nietfeld, et al. (2006) contend that as their intervention progressed over the span of exercises during a college semester, self-efficacy beliefs were transformed into accurately informed beliefs of competence when typically, self-efficacy beliefs would have been overinflated. Collectively, components of successful monitoring interventions include (a) predictions of performance (a self-efficacy belief), (b) postdictions (or self-assessments) of performance, (c) feedback on the accuracy of the predictions and postdictions, and (d) incentives for accuracy (Hacker, Bol, Horgan, & Rakow, 2000; Nietfeld, et al., 2006; Schraw, Potenza, & Nebelsick-Gullet, 1993).

Monitoring interventions may be a useful approach to improving the accuracy of outdoor educators' self-efficacy beliefs for several reasons. An example in the context of

outdoor education may help to clarify. An outdoor educator-in-training may be asked to teach route finding in alpine terrain during an outdoor education instructor course. First, the trainee would make a prediction of her performance (a self-efficacy belief) using a worksheet containing the relevant outdoor education domains (e.g., instruction and assessment, technical skill; Article 1). Then, after teaching the lesson she would postdict, or self-assess, her performance in the domains on the same form. Subsequently, the course instructor would score the same form in order for the educator-in-training to compare her prediction and self-assessment of her actual performance as rated by the expert observer. Any discrepancies could be noted and the educator-in-training can see if her efficacy beliefs and self-assessments were accurate self-beliefs of competence. By noting the content and direction of any inaccuracies (over or underestimations) the outdoor educator-in-training can integrate this information to better calibrate her future self-appraisals, behaviors, and skill development.

Additional structural components of monitoring interventions include time, self-explanations, and incentives for accuracy. Calibrating overestimations or underestimations of competence takes time (e.g., Hacker, Bol, & Bahbani, 2008). Monitoring interventions involve multiple monitoring exercises over repeated events. This allows individuals to see patterns in their monitoring accuracy, making it more difficult to dismiss miscalibrated beliefs as isolated anomalies. Second, encouraging students to self explain (Chi & Van Lehn, 1991) their monitoring performance can help to improve understanding, subsequent performance, and transfer of learning to similar contexts (Tajika, et al., 2007). Self-explanation involves generating comments about one's performance; these explanations sometimes extend beyond initial perceptions (Chi & VanLehn, 1991). Lastly, when accuracy

for predictions and self-assessments is incentivized calibration improves (Hacker, Bol, Horgan, & Rackow, 2000; Schraw, Potenza, Nebelsick-Gullet, 1993). In outdoor education training contexts incentives for performance are inherent. Because high performance on trainings lead to employment opportunities or recommendations for advancement, a trainer simply needs to inform students that accurate self-assessments (not over or underestimations) are desired.

Therefore, the intent of this study is to examine the following research question:
Can the accuracy of teaching outdoor education self-efficacy beliefs be improved through the application of a metacognitive monitoring intervention?

Methods

Participants and Setting

Established in 1965, NOLS combines the development of outdoor leadership, education, and technical skills with disciplines such as biology and natural history in outdoor environments. Study participants were students enrolled in National Outdoor Leadership School (NOLS) instructor courses between April 2011 and July 2011. Six NOLS Instructor Courses (IC) occurred in wilderness expedition-based contexts in mountain, river, ocean, and desert environments. In addition to teaching various topics while on course, students were introduced to procedures and standards of practice at NOLS. At the completion of the course, participants may have been offered employment at one of NOLS course areas across the United States or abroad.

Measures

The main variable of interest in this study was *teaching outdoor education self-efficacy* (TOESE). Self-efficacy beliefs are generally considered context specific, meaning that beliefs in one broad area such as teaching, do not apply to other unrelated areas such as athletics. Further, the more context-specific a self-efficacy belief is within a domain, the more likely it is to be accurate. Accordingly, teaching outdoor education self-efficacy beliefs are defined as an educator's beliefs in one's capability to organize and execute the courses of action required to successfully accomplish teaching tasks in the outdoor education setting. For the purposes of this study, the Teaching Outdoor Education Self-Efficacy Scale (TOESES 23, Article II) was used to measure participants' self-efficacy beliefs specific to five outdoor education domains.

The TOESES 23 domains include instruction and assessment, outdoor classroom management, technical skill, interpersonal skill, and environmental integration. *Instruction and assessment* (IA) is defined as the ability to effectively prepare and implement teaching strategies, gain and maintain a diverse group of students' interests, and assess student performance. *Outdoor classroom management* (OCM) refers to the ability to effectively teach in the natural environment while managing student's physical comfort and the risks inherent in the outdoor environment. The *technical skill* (TECH) domain is defined as the ability to successfully and safely perform the necessary outdoor skills relevant to accomplishing a particular lesson or activity. The *interpersonal skill* (INTPER) domain is defined as the ability to build rapport, effectively listen, understand, empathize, demonstrate sincerity, and show respect for student differences in culture, interests, and skill. Lastly, *environmental integration* (ENVINT) is defined as an outdoor educator's ability to

effectively address ecological considerations throughout their educational practice in the effort to develop students' environmental ethic, connections to the environment, and understanding of the environments in which they travel.

As per Bandura, (2006), items on the TOE-SES 23 are scored on a scale of 0 -100% confidence; this attends to the strength of the self-efficacy belief. In addition, the scale addressed self-efficacy generality as it collectively attends to the breadth of outdoor educator practice. The TOE-SES 23 functions as a multidimensional scale with sufficient psychometric properties and internal consistencies across the five subscales: instruction and assessment ($\alpha =.90$), outdoor classroom management ($\alpha =.83$), technical skill ($\alpha =.81$), interpersonal skill ($\alpha =.82$), and environmental integration ($\alpha =.88$).

Procedures

Courses were split into two matched groups based on course location and course dates and then randomly assigned to a treatment or control group. The treatment group participated in a monitoring intervention. The treatment group included three courses and the control group included three courses. At the beginning and end of both the control and treatment courses, participants completed the TOE-SES 23. At the conclusion of each course, each of three course instructors completed an instructor form of the TOE-SES 23 scoring it for each individual student. Each instructor was asked to indicate a confidence level (0 – 100%) in their ability to accurately evaluate the particular student. This allowed for a weighted composite instructor score for subsequent analyses. Thus, accuracy is defined as conformance to the instructor team score, for purposes of this study because no definitive

criterion exists. It should be noted that NOLS IC staff are accomplished senior instructors and it is likely that their internal metrics are well calibrated given their extensive experience. The treatment and control groups had several opportunities to teach during the NOLS IC (up to four times each). Prior to teaching a topic, students in the treatment group completed a monitoring intervention worksheet (see Appendix a). Students were instructed to predict their performance in the upcoming lesson regarding each of the five domains of outdoor education. Below each domain were two prompts to cue the students into the domain. The students rated their performance in each domain on a Likert-type scale (9 = Excellent - comparable to senior NOLS Instructor, 4 = Acceptable - comparable to a first year NOLS instructor, 1 = Novice - below a basic level of proficiency). A sample prompt from the outdoor classroom management domain on the prediction worksheet reads: “How well will you manage your students’ protection from the environment?” (Article 1) Then, the students taught their lesson.

Once the lesson concluded, the students turned over the monitoring worksheet and completed a self-assessment of their performance in each of the five domains using the Likert-type scale. The self-assessment version was worded in past tense (e.g., In the lesson you just taught, how well did you manage your students’ protection from the environment?). Lastly, the student’s mentor, or another instructor if his or her mentor was not present, evaluated the actual performance on an instructor form containing the five domains and same Likert-type scale. The instructor presented the observation to the student and encouraged the student to compare these data with their predictions and self-assessments of performance. This comparison between self and instructor evaluations served as monitoring information for the student (i.e., was the student score an over or underestimation of performance).

Ultimately, this information indicated the accuracy of their self-assessments and self-efficacy beliefs and was intended to help students calibrate their beliefs over time.

Participants kept their worksheets in a pre-stapled booklet throughout the course for reference during mid-course check-ins with the course instructors where they had the opportunity to discuss their monitoring accuracy if they desired. The mid-course check-ins occurred on all NOLS ICs (treatment and control).

Data Analysis

A 2 x 2 multivariate profile analysis was used to test the research question: Does the accuracy of teaching outdoor education self-efficacy beliefs improve with the application of a monitoring intervention? Group membership (treatment or control) served as the between subjects effect. The within subjects effect had two sources: a student self-assessed TOE-SES 23 score and a corresponding instructor generated TOE-SES 23 score. The instructor score was a weighted composite of the three course instructors' scores according to the instructors' confidence in his or her ability to accurately evaluate the student. The hypothesis that the accuracy of teaching outdoor education self-efficacy beliefs would depend on group membership was assessed through the interaction of group and source.

The use of profile analysis allowed for examination of three features of each profile: parallelism, level, and flatness (Tabachnick & Fidell, 2007). Test of parallelism of profiles allows for examination of an interaction effect between group (treatment and control) and source (student and instructor). In other words, a significant result to the test of the parallelism hypothesis (i.e., the profiles are nonparallel) indicates that the accuracy of self-efficacy beliefs depends upon group membership. Profile analysis also allowed for

examination of the levels hypothesis of profiles; that is, does one group score higher or lower across the TOE-SES 23 subscales than another group. The flatness hypothesis of profiles examines the similarity of self-efficacy beliefs independent of group membership. Flatness is typically only relevant if profiles are parallel. Examination of the proximity between the source scores (student subscale scores and instructor subscale scores) provided data regarding the calibration of student self-efficacy beliefs. The closer student means are to instructor means reflects how accurate, or how well calibrated, students' self-efficacy beliefs are to the instructors' assessment. The *self-efficacy* level of profiles and *group Xsource* parallelism were tested using the multivariate criterion of Wilks's lambda.

Given the multivariate nature and interdependence of the five dependent variables for each source, Discriminant Function Analysis was used to follow-up a significant omnibus test (Tabachnick & Fidell, 2001). A structure matrix was calculated and group centroids plotted to facilitate interpretation.

Results

Forty-four of the IC students agreed to participate in the study. They were 51% female and 49% male, they averaged 26 years in age. Prior to initial analysis, the data were cleaned and screened for univariate outliers. Four respondents contained incomplete data, and were removed from the analysis. Ultimately, the treatment group contained 22 ($n=22$) participants and the control group contained 18 ($n=18$). In order to ensure similarity between the treatment and control groups, a MANOVA was used to test for group differences in student *pretest* scores across the five self-efficacy subscales of the TOE-SES 23; no significant difference was found between groups $p = .187$.

TOE-SES 23 source and group membership deviated significantly from parallelism $\Lambda = .72$, $F(5,34) = 2.63$, $p < .05$, thus indicating a significant interaction. The results also indicated significant differences in source profile flatness $\Lambda = .366$, $F(5,34) = 11.8$, $p < .001$ and significant difference in profile levels for group membership $\Lambda = .536$, $F(5,34) = 5.88$, $p < .001$. The multivariate effects are shown in Table 4.1.

The interaction was significant, profiles were not parallel, and a Discriminant Function Analysis was used as a follow-up. Only one factor was extracted and interpreted ($R_c = .53$, $p < .05$). Coefficients loading higher than .30 were considered part of the function for interpretation purposes (Tabachnick & Fidell, 2001). Function 1 demonstrates how the treatment group differs from the control group showing higher structure coefficient scores for self-efficacy accuracy on outdoor classroom management, technical skill, interpersonal skill, and environmental integration. Discriminant function structure is presented in Table 4.2.

Table 4.1. Within Subjects Effects for Teaching Outdoor Education Self-Efficacy

Effect	Wilks's Lambda	<i>F</i>	Hypothesis df	Error df	<i>p</i>
Group*Source	0.721	2.63	5	34	0.041
Source	0.366	11.80	5	34	0.000
Group (Tx/Con)	0.536	5.88	5	34	0.001

Table 4.2. Discriminant Function Analysis - Structure Matrix

Teaching Outdoor Education Self-Efficacy Domains	Function Coefficients
Instruction and Assessment	.059
Outdoor Classroom Management	.313
Technical Skill	.492
Interpersonal Skill	.429
Environmental Integration	.480

Figure 4.1 is a plot of the variates centered around the mean. The figure reveals that the treatment group self-efficacy beliefs were significantly more accurate in relation to their instructors' assessments as noted by the smaller distance between the centroids compared to the control group. In other words, as a result of enhanced accuracy in the outdoor classroom management, technical skill, interpersonal skill, and environmental integration self-efficacy domains, the treatment group were overall better calibrated in their self-efficacy beliefs than the control group at course end. Means and standard deviations of the variates are presented in Table 4.3.

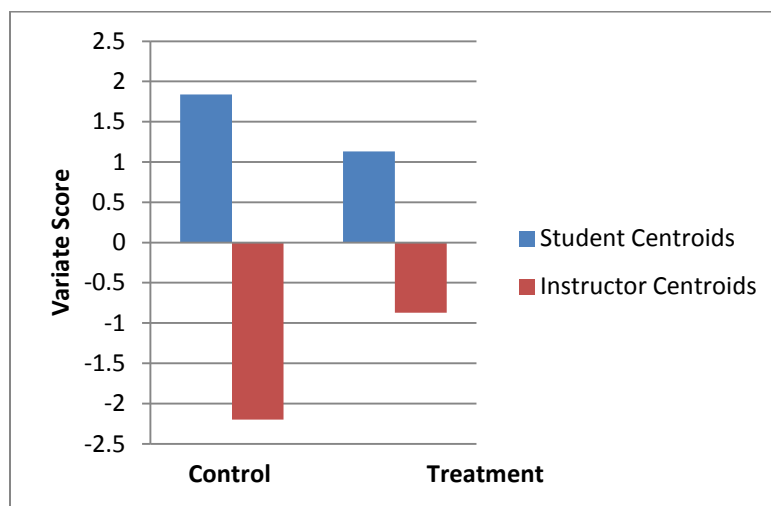


Figure 4.1. Variate Centroids by Group

Table 4.3. Means and Standard Deviations of Variates

Group	Variate Source	<i>M</i>	<i>SD</i>
Control	Student	24.34	1.25
	Instructor	20.31	2.61
Treatment	Student	23.64	2.91
	Instructor	21.63	1.68

Although it is difficult interpret level and flatness of profiles due to the interaction between group and source, each of these is worth noting here. In relation to the level of profiles, treatment group scores were higher at the end of the courses in both instructor and student ratings. Regarding flatness, the means in Table 3 indicate instructor scores as being lower than student self-assessments regardless of group membership.

Exploratory Data Analysis

In an effort to further understand the nature of emerging outdoor educator's teaching self-efficacy beliefs and the potential of monitoring interventions, raw mean scores were examined across self-efficacy subscales in relation to groups (treatment and control) and sources (students and instructors). The means and standard deviations for student and instructor evaluation scores on TOE-SES 23 domains are presented in Table 4.4.

The means for both the control and treatment group student scores across TOE-SES 23 subscales were all higher compared to instructor scores. Control group scores were generally higher than the treatment group. Technical skill was the most poorly calibrated by the control group whose mean was 15.88 points above the instructor mean, followed by the control groups' interpersonal scores which were overestimated by 12.74. The most accurate self-efficacy beliefs were the treatment group in the environmental integration domain, which was near perfectly accurate at .30 points above the instructor mean. Lastly, instructor means in the OCM, TECH, INTPER, and ENVINT subscales for treatment group participants were higher than control group participants. Although not significant in this small sample study, this trend in means indicates that at the end of the intervention, treatment group participants

Table 4.4. Means and Standard Deviations for Student and Instructor TOE-SES 23 Domains

	Group	<i>M</i>	<i>SD</i>
Student IA	Control	88.06	6.36
	Treatment	81.95	11.99
Instructor IA	Control	79.41	11.51
	Treatment	74.20	9.82
Student OCM	Control	90.26	6.59
	Treatment	87.44	10.74
Instructor OCM	Control	81.77	11.85
	Treatment	82.94	5.39
Student TECH	Control	90.90	5.44
	Treatment	88.31	11.94
Instructor TECH	Control	75.02	10.38
	Treatment	79.07	7.02
Student INTPER	Control	89.69	6.94
	Treatment	86.57	11.32
Instructor INTPER	Control	76.95	11.79
	Treatment	80.39	6.32
Student ENVINT	Control	83.76	9.77
	Treatment	78.75	12.48
Instructor ENVINT	Control	76.16	12.82
	Treatment	78.45	10.44

IA = Instruction and Assessment

OCM = Outdoor Classroom Management

TECH = Technical Skills

INTPER = Interpersonal Skills

ENVINT = Environmental Integration

may have been more *competent* in these four domains of outdoor education practice than the control group.

Discussion

The purpose of this study was to examine the influence of a monitoring intervention on the accuracy of emerging outdoor educators' teaching self-efficacy beliefs. The present study did not seek to increase self-efficacy beliefs but rather, improve the accuracy of those

beliefs compared to instructor observations. Results indicate that a monitoring intervention significantly improved the calibration of teaching outdoor education self-efficacy beliefs. These results are consistent with previous findings in metacognitive monitoring intervention research (Nietfeld, Cao, & Osborne, 2006). Compared to the control group, it appears that the treatment groups' self-efficacy beliefs were transformed into more accurate beliefs regarding their likelihood of success in future outdoor education contexts.

Participants in this study were in the early stages of developing their teaching outdoor education self-efficacy beliefs thus, making them particularly susceptible to change. This susceptibility is primarily due to the lack of previous experiences and self-assessments (Bandura, 1986). At most, treatment group participants completed three monitoring interventions; some completed as few as one. It appears it did not take much to reduce any overestimation perhaps, due to the limited number of previous self-assessments. In addition, the instructors providing feedback were likely revered as experts, making the instructor assessment an influential source of self-efficacy development. In a sense, monitoring intervention feedback from the instructor may have served as a "slap in the face" or a "wake-up-call" which was helpful in de-biasing participants self-assessments.

The outdoor education domains which contributed the most to an overall difference in teaching self-efficacy belief accuracy included technical skill, environmental integration, interpersonal skill, and outdoor classroom management. Because of the dire consequences associated with inflated self-efficacy beliefs in technical skills (cf. Martin & Priest, 1985), these results are particularly encouraging. Treatment group participants may ultimately make safer decisions, as future outdoor educators, based on accurate self-appraisals of technical skill. In addition, given that outdoor education occurs in natural landscapes, the relatively

high influence of the environmental integration domain was also encouraging as this is a unique characteristic of outdoor education that sets it apart from other disciplines of education.

Interestingly, exploratory data analysis revealed that technical skill scores for the control group were the most *inaccurate and overestimated* compared to all other outdoor education domains. Grossly inaccurate beliefs in technical skill might be devastating; recognizing that teacher self-efficacy beliefs influence the likelihood of experimenting with new teaching strategies (Allinder, 1994) and persistence amidst set-backs (Tschannen - Moran, Woolfolk Hoy, & Hoy, 1998). These findings point to the importance of attending to the accuracy of teacher self-efficacy beliefs.

Wheatley (2005) explains that educators who possess an accurate sense of their strengths and weaknesses are more likely to devote time to areas needing improvement and are less likely to waste time in areas where their strengths exist. If at the end of the course the treatment group indeed possessed a more accurate sense of their competence it is possible that these outdoor educators-in-training may ultimately improve their performance, safety, and effectiveness as a result of developing the skills they accurately believed they were lacking (Thiede, Anderson, & Therriault, 2003).

Simply stated, the emerging outdoor educators-in-training who participated in the monitoring intervention were overall better at “knowing what they know and what they don’t know” (Petzoldt in Wagstaff, 2005) which may ultimately make them safer and more effective outdoor educators in the future.

Limitations

While this study has several limitations, the foremost is likely the difference in instructors across the treatment and control group. The results may have been a reflection of different instructors' ability to influence the learning environment and provide meaningful feedback to the educators-in-training. Other issues include the relatively small convenience sample and the quasi-experimental design. Issues establishing the instructor score as an objective reliable assessment may also exist. Despite efforts to take the accuracy of instructor beliefs into account (weighting the instructor scores based on confidence), instructors' perceptions of student competence may have been misinformed or biased. Lastly, issues with fidelity in the monitoring intervention existed: 100% of participants completed at least one monitoring exercise (prediction, postdiction, instructor feedback), 65% completed at least two monitoring exercises, and 20% completed at least three monitoring exercises. Each of these limitations should be considered when interpreting the findings of this study.

Implications for Future Research

Future researchers may benefit from examining not only the accuracy of self-efficacy beliefs but also the improvement of performance over time as this is a likely long-term effect of improved accuracy in self-assessments and efficacy beliefs (cf. Thiede, Anderson, & Therriault, 2003). In this study, a performance assessment was not conducted at course start, thus the present findings cannot conclude that in addition to self-efficacy belief accuracy, performance also improved. However, this conclusion may have merit as exhibited by the overall higher instructor-based scores for the treatment group in four of the five teaching

outdoor education domains (technical skill, outdoor classroom management, interpersonal skill, and environmental integration).

Future researchers might examine the degree of overestimation of teaching outdoor education self-efficacy beliefs. What kinds of consequences have resulted from overestimation of teaching self-efficacy beliefs in outdoor education contexts, either positive or negative? If as Bandura (1986) contends, a slight overestimation in self-efficacy is ideal, what might be a desirable degree of overestimation?

Implications for Practice

The results of this study should be of particular relevance for individuals who train outdoor educators. A goal of outdoor educator training programs should not only be to teach future educators relevant skills but also to ensure that educators-in-training have an accurate sense of competence in those skills. If staff trainers can successfully facilitate the calibration of their trainees' outdoor educator self-efficacy beliefs, this may ultimately help direct the trainees toward areas needing skill development.

Current outdoor education practice espouses using feedback as an effective means of instruction (e.g., Gookin, 2006); however this intervention included several conditions making a monitoring intervention more than simply feedback. The conditions implemented in the present study include: prediction of performance, self-assessment of performance, incentives for accuracy, comparison to an external observation, and self-explanation of errors in calibration (Hacker, Bol, Horgan, & Rakow, 2000; Nietfeld, et al., 2006). The unique component of a prediction of performance may be one component that sets a monitoring intervention apart from current practice as it allows students to see how accurate their

efficacy beliefs are. Another distinguishing characteristic may be the opportunity for students to quantifiably examine calibration accuracies between self-assessments and instructor scores. Staff trainers might consider each of these as conditions to implement into existing practice. The monitoring exercises took no more than 5 minutes before and after educators-in-training delivered a lesson, yet it was effective in reducing inflated self-efficacy beliefs.

Lastly, amidst improved calibration of beliefs, the monitoring intervention group appeared to keep a healthy slight over-estimation of teaching self-efficacy beliefs. A slight overestimation is desirable (Bandura, 1987) because it can result in an appropriate amount of tenacity while stopping short of obstinacy. Indeed, many great accomplishments have resulted from a belief in one's likelihood of success amidst uncertainty and the present intervention may be a means for trainers to help educators-in-training develop an appropriate level of resolve in their outdoor educational endeavors.

Conclusion

Unchecked self-efficacy enhancement in outdoor educators should be approached with caution due to the consequences in outdoor education contexts. Unfortunately, outdoor education research and practice has placed value only on the increase of self-efficacy beliefs. Although a slight overestimation in self-efficacy beliefs can be beneficial and increase persistence; recent research has shown that efforts to simply increase self-efficacy beliefs can result in overinflated beliefs, improper selection of behaviors, and decreases in performance or failure. Instructional interventions which increase students' abilities to better calibrate the accuracy of their beliefs with their actual performances are needed (e.g., Pajares & Kranzler, 1995). Because teacher self-efficacy beliefs become relatively stable once they are

established, intervention to calibrate the accuracy of these beliefs is of utmost importance early in outdoor education training. Metacognitive monitoring is a strategy to effectively intervene reducing inaccurate self- assessments and self-efficacy beliefs.

Results of this study indicate a monitoring intervention was able to significantly improve the accuracy of emerging outdoor educators' teaching self-efficacy beliefs. Demonstrating the need for interventions to reduce inflated self-beliefs, the educators-in-training who did not participate in the monitoring intervention appeared to consistently overestimate their likelihood of success across all domains of teaching outdoor education. Essentially, those who participated in the monitoring intervention were better at knowing what they know and what they do not know.

Attending to the accuracy of teacher self-efficacy beliefs early in an educator's career may help him approach or avoid tasks when appropriate (Bandura, 1986) and ultimately, direct him toward developing the skills he is lacking. The present study demonstrates that a monitoring intervention can be a useful approach to support emerging outdoor educators as they hone a complex set of skills to effectively and safely teach in the outdoors.

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CHAPTER 5

SUMMARY

Three distinct chapters were presented here in the effort to improve outdoor educators' understandings of their strengths and weaknesses, thereby allowing them to more fully and safely teach and lead others in the outdoors. Chapter 2 broadly examined self-efficacy beliefs in outdoor leaders and demonstrated importance of accurate self-efficacy beliefs in outdoor education and the dire consequences when beliefs are inflated. Chapter 3 narrowed the focus of this dissertation on the measurement of a specific self-efficacy belief: *teaching outdoor education self-efficacy* (TOESE). Lastly, buoyed by the theoretical and conceptual understandings of one and the empirical understandings from Chapter 2, Chapter 4 presented an experiment designed to improve the accuracy of TOESE beliefs. Ultimately, through the processes of the three chapters (or articles), a monitoring intervention was found to be an effective means to improve the accuracy of emerging outdoor educators TOESE beliefs.

Chapter 2 examined the accuracy of self-efficacy beliefs in outdoor education from a theoretical perspective, identified potential sources of inaccurate self-efficacy beliefs present in outdoor leadership training, and offered strategies to intervene and develop more accurate beliefs. The overprovision of success, isolated lessons of instruction, and inadequately processed experiences may each contribute to an illusion of competence in outdoor leaders.

This chapter proposed several solutions to this for outdoor leader trainers to consider. Solutions included providing a balance between success and failure and integrating lessons to more accurately reflect future contexts in which the outdoor leaders in training may find themselves. Each of these strategies would provide a more accurate index for trainees to develop a sense of their current skills. The final proposed solution to inaccurate self-efficacy in outdoor leaders was the adaption of components in metacognitive monitoring interventions (e.g., Hacker, Bol, Horgan, & Rakow, 2000; Nietfeld, Cao, & Osborn, 2006). In essence, metacognition was what Paul Petzoldt, famed outdoor educator, was referring to when he would say “You’ve got to know what you know and know what you don’t know” (Wagstaff, 2005, p. 6). Metacognition is the notion of knowledge about the knowledge and skills an individual possesses (Flavell, 1979). As such, the direction of the following two chapters was toward implementation of a metacognitive monitoring intervention and measurement of the changes in TOESE beliefs.

Chapter 3 was a necessary step for implementing a monitoring intervention to effect TOESE beliefs. The purpose of the chapter was to develop and validate an instrument to measure teaching outdoor education self-efficacy beliefs. Chapter 3 was comprised of two studies: scale development through exploratory factor analysis (EFA) and scale validation through confirmatory factor analysis (CFA). Study one ($N = 303$) examined a proposed seven factor structure of outdoor education practice. EFA results indicated a 23-item, 5-factor structure which included (a) instruction and assessment, (b) outdoor classroom management, (c) technical skill, (d) interpersonal skill, and (e) environmental integration. The CFA in study two ($N = 200$) examined the fit of this. Results indicated an acceptable fit with strong internal consistency and convergent validity. Thus, study two produced the

Teaching Outdoor Education Self-Efficacy Scale with 22 items. Although, the results indicated an acceptable fit, there were indications that the model could be improved.

Suggestions for future researchers were provided and include examining the effect of additional items or reexamining the subscales domains to ensure the latent construct of teaching outdoor education self-efficacy was comprehensively captured. The TOE-SES was not intended to simply measure beliefs but rather, measure the beliefs in an effort to provide feedback on the accuracy of TOESE beliefs. Attempts to increase self-efficacy beliefs would be misguided without attending to their accuracy. Particularly in outdoor contexts, educators' self-efficacy beliefs can be inflated and carry consequences for student learning and student safety (cf. Martin & Priest, 1986). Therefore, Chapter 4 used the TOE-SES to measure the effects of an intervention on the accuracy of TOESE beliefs.

The purpose of Chapter 4 presented in this sequence of research studies was to examine the effects of a monitoring intervention on the *accuracy* of teaching outdoor education self-efficacy beliefs. Metacognitive monitoring interventions were identified in article one as a possible approach to help emerging outdoor educators calibrate their beliefs with their actual performances and article two produced a scale to measure these beliefs. Treatment group participants on National Outdoor Leadership School Instructor Courses predicted their performance (a self-efficacy belief) before teaching a course topic, self-assessed that performance, and compared the accuracy of their predictions and self-assessments to an expert evaluation of their performance. Through the repeated process of noting the content and direction of any inaccuracies (over- or under-estimations) in self-efficacy beliefs and self-assessments, results indicated outdoor educators-in-training integrated this information and calibrated their TOESE beliefs better than the control group.

Furthermore, amidst improved calibration of beliefs, the monitoring intervention group appeared to keep a healthy slight over-estimation of teaching self-efficacy beliefs. A slight overestimation in self-efficacy beliefs is considered desirable (Bandura, 1987) because it can result in an appropriate amount of tenacity while stopping short of obstinacy. The intervention implemented in chapter four may be a means for trainers to help educators-in-training develop an appropriate level of resolve in their outdoor education endeavors. Attending to the accuracy of teacher self-efficacy beliefs early in an educator's career may help him approach or avoid tasks when appropriate (Bandura, 1986) and ultimately, direct him toward developing the skills he is lacking. The chapters presented here demonstrate a need for more accurate self-efficacy beliefs in outdoor education, provide a means to measure those beliefs, and lastly proposed an intervention to improve the accuracy of teaching self-efficacy beliefs in the outdoor education contexts. Teaching outdoor education is a complex task involving several factors, monitoring interventions are a strategy outdoor educator trainers should consider in their efforts to help emerging outdoor educators hone a complex set of skills to effectively and safely teach in the outdoors.

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APPENDIX A

MONITORING WORKSHEETS

Part 1- Predict your performance

An instructor's *accuracy* in their self-assessment is crucial. Being able to know where your strengths and weakness are will help you become a more effective educator. This worksheet focuses on teaching abilities in five areas. Predict your level of performance in your upcoming teaching topic in each area by circling a score from the scale below and then, write a note explaining why you think you will perform to that level in each area. Remember you're shooting for accuracy, do not over or underestimate. (Circle N/A if you feel the topic is not applicable to your present lesson)

1	2	3	4	5	6	7	8	9
Novice below a basic level of proficiency				Acceptable comparable to a first year instructor				Excellent comparable to a seasoned instructor

Instruction and Assessment

Predicted Performance: 1 2 3 4 5 6 7 8 9 N/A

(For example: How well will your strategies address different learning preferences? How well will you effectively facilitate discussion? Etc...)

Outdoor Classroom Management

Predicted Performance: 1 2 3 4 5 6 7 8 9 N/A

(For example: How well will you monitor your students' protection from the environment? How well will you select an appropriate instructional site to manage student challenge while managing risk? Etc...)

Interpersonal Skill

Predicted Performance: 1 2 3 4 5 6 7 8 9 N/A

(How well will you communicate empathy for your students? How well will you communicate sensitivity for gender differences? Etc...)

Part 1- Predict your performance (continued)

Technical Skill Predicted Performance: 1 2 3 4 5 6 7 8 9 N/A
(If your topic involves technical skills, how well will you demonstrate those skills? Etc...)

Environmental Integration Predicted Performance: 1 2 3 4 5 6 7 8 9 N/A
(If appropriate, how well will you inform the students of local flora or fauna? How well will you integrate land management issues into your lesson? Etc...)

Part 2- Assess your performance

Now, reflect on your performance and evaluate yourself. Remember we don't want to see humility; we're looking for accuracy in your self-assessment. We want to see if you know how well (or poorly) you did. Give yourself a score and write a note to explain why you think your performance was to that level in each teaching area.

1	2	3	4	5	6	7	8	9
Novice below a basic level of proficiency				Acceptable comparable to a first year instructor				Excellent comparable to a seasoned instructor

Instruction and Assessment Self- Assessed Performance: 1 2 3 4 5 6 7 8 9 N/A
(For example: How well did your strategies address different learning preferences? How well will did you facilitate discussion? Etc...)

Outdoor Classroom Management Self- Assessed Performance: 1 2 3 4 5 6 7 8 9 N/A
(For example: How well did you monitor your students' protection from the environment? How well did you select an appropriate instructional site to manage student challenge while managing risk? Etc...)

Interpersonal Skill Self- Assessed Performance: 1 2 3 4 5 6 7 8 9 N/A
(How well did you communicate empathy for your students? How well did you communicate sensitivity for gender differences? Etc...)

Assess your performance (continued)

Technical Skill Self- Assessed Performance: 1 2 3 4 5 6 7 8 9 N/A
(If your topic involved technical skills, how well did you demonstrate those skills? Etc...)

Environmental Integration Self- Assessed Performance: 1 2 3 4 5 6 7 8 9 N/A
(If appropriate, how well did you inform the students of local flora or fauna? How well did you integrate land management issues into your lesson?
Etc...)

Instructor Form

Your instructor(s) have completed the evaluation below based on their observation of your recent teaching performance. You are encouraged to compare their scores and comments in each teaching domain with your own predictions and your self-assessment. (i.e., How accurate was your self-assessment? Was it over-estimated or under-estimated compared to your instructor observations? Why? What can you do to improve your teaching and the accuracy of your self-assessment in the future?)

1	2	3	4	5	6	7	8	9
Novice below a basic level of proficiency				Acceptable comparable to a first year instructor				Excellent comparable to a seasoned instructor

Instruction and Assessment Observed Performance: 1 2 3 4 5 6 7 8 9 N/A
(For example: Did his or her strategies address students' different learning preferences? How well did he or she facilitate discussion? Etc...)

Outdoor Classroom Management Observed Performance: 1 2 3 4 5 6 7 8 9 N/A
(For example: How well did he or she monitor students' protection from the environment? How well did he or she select appropriate instructional sites to manage student challenge while managing risk? Etc...)

Interpersonal Skill Observed Performance: 1 2 3 4 5 6 7 8 9 N/A
(How well did he or she communicate empathy for the students? How well did he or she communicate sensitivity for gender differences? Etc...)

Instructor Form (continued)

Technical Skill Observed Performance: 1 2 3 4 5 6 7 8 9 N/A
(If his or her topic involved technical skills, how well did the teacher demonstrate those skills? Etc...)

Environmental Integration Observed Performance: 1 2 3 4 5 6 7 8 9 N/A
(If appropriate, how well did he or she inform the students of local flora or fauna? How well did he or she integrate land management?)

APPENDIX B

TEACHING OUTDOOR EDUCATION
SELF-EFFICACY SCALE (TOE-SES 22)

Teaching Outdoor Education Self-Efficacy Scale

Practice Rating

To familiarize yourself with the rating system, please complete this practice question first. If you need help with the practice questions, please get help from the person who gave you this form.

If you were asked to lift backpacks of different weights **right now**, how certain are you that you can lift each of the backpacks described below?

Rate your degree of confidence by recording a number from 0 to 100 using the scale given below:

0 %	10	20	30	40	50	60	70	80	90	100 %
Cannot do at all					Moderately certain can do					Highly certain can do

	% of Confidence
Lift a 10 pound backpack	_____
Lift a 20 pound backpack	_____
Lift a 50 pound backpack	_____
Lift a 80 pound backpack	_____
Lift a 100 pound backpack	_____
Lift a 150 pound backpack	_____
Lift a 200 pound backpack	_____
Lift a 300 pound backpack	_____

Actual Ratings

Now, please rate your degree of confidence by recording:

How certain you are that you can currently perform the following tasks throughout a week-long wilderness backpacking expedition with 10 students.

- | | Confidence
0 – 100% |
|--|------------------------|
| 1. Create lessons to meet the needs of a diversity of learners. | _____ |
| 2. Introduce topics in creative ways that are engaging for your students. | _____ |
| 3. Facilitate discussion in a variety of ways. | _____ |
| 4. Use teaching strategies that address different learning preferences. | _____ |
| 5. Be prepared to explain subject matter in several distinctly different ways to your students. | _____ |
| 6. Accurately assess each student's performance. | _____ |
| 7. Select appropriate outdoor instructional sites to maximize student challenge while managing risk. | _____ |
| 8. Accurately monitor each of your students' protection from the environment. | _____ |
| 9. Adapt your instruction based on changes in the hazards present in your outdoor classroom. | _____ |

How certain you are that you can *currently* perform the following tasks throughout a week-long wilderness backpacking expedition with 10 students.

- | | Confidence |
|--|------------|
| | 0 100% |
| 10. Effectively manage instructional time so that students basic needs are met (food, shelter, rest...). | _____ |
| 11. Without error, <i>demonstrate</i> how to use a map and compass. | _____ |
| 12. Accurately develop a travel plan to reach your final destination. | _____ |
| 13. Appropriately adjust travel plans due to changes in environmental conditions. | _____ |
| 14. Demonstrate how to conduct a patient assessment of an individual who has been injured by rock fall. | _____ |
| 15. Communicate with your students in ways that demonstrate sensitivity to cultural differences. | _____ |
| 16. Communicate empathy for every one of your students. | _____ |
| 17. Communicate patience with your students after a long day of difficult weather. | _____ |
| 18. Communicate with your students in ways that demonstrate sensitivity to gender differences. | _____ |
| 19. Facilitate discussion surrounding ecological concepts. | _____ |
| 20. Interpret the basic health of environmental systems. | _____ |
| 21. Deliver lessons to inform students of local flora and fauna. | _____ |
| 22. Integrate current land management issues into your lessons. | _____ |

What is your NOLS course number? _____

What is today's date (MM/DD/YYYY): _____

What is your birth date (MM/DD/YYYY)? _____

Are you? (please circle one) Male Female

Please indicate approximately how many field-weeks you have worked as an outdoor educator (a week is 7 days in the field): _____ weeks

Thank you for your time in completing this questionnaire.