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The Development and Scaling of the Teaching Outdoor Education Self-Efficacy Scale

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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. This paper presents two studies conducted to develop a teaching outdoor education self-efficacy scale (TOE-SES). In Study 1, data were collected from 303 participants in collegiate outdoor programs. Exploratory Factor Analysis reduced a 49-item pool to a 23-item scale comprised of 5 subscales. In Study 2, data were collected from 200 National Outdoor Leadership School (NOLS) instructor and outdoor educator course participants. Confirmatory Factor Analysis results indicated an acceptable fit for a 22-item, 5-factor scale with strong subscale internal consistencies.

Keywords: *outdoor education, teaching, self-efficacy, measurement*

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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 setbacks 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. Scores on such a scale would help trainers better understand the accuracy of perceptions of competence in emerging educators-in-training. 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 that 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 (Muijs & Reynolds, 2002), the likelihood of experimenting with teaching strategies (Allinder, 1994), and persistence in the face of setbacks (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) toward 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 in the United States, 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 multi-dimensional nature of outdoor education practice.

The Wilderness Education Association (WEA) has recently developed accreditation standards in accordance with the U.S. 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 from which to teach. Gookin explains, "a teacher generally needs to know 5 to 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 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 that 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 location.[1]"

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 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 (Pelchat & Williams, 2009; Martin et al., 2006, Gookin, 2003). A sample item is as follows: "Integrate current land management issues into your daily lessons."

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[1]Items 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).

Study 1 Scale Development

Methods

Design

DeVilles'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 to 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 are you 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 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.

[2]This 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 are you that you can *currently* perform the following tasks throughout a week-long *sea-kayaking* expedition with ten students?"

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 that 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, participant 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), and 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 was 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, inter-item correlations, content validity feedback, and discrimination statistics. Items were deleted based on low squared multiple correlations, followed by low item-scale correlations.

Study 1 Results

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, $p < .001$. The initial factor analysis was performed on the 49-item instrument with forced extraction of the hypothesized 7 factors. The analysis revealed 7 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, $\alpha = .88$). Table 1 presents a pattern matrix for the factor loadings of the final solution. A factor correlation matrix is presented in Table 2.

Study 2 –Factor Analysis and Validation

Methods

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 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.

Table 1

Pattern Matrix of Final Solution of the Five Factor Principal Axis Factor Analysis with Oblim Rotation

	Sub-Scale				
Item	IA	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	
Without error, demonstrate how to use a map and compass.		.80			
Accurately develop a travel plan to reach your final destination.		.70			
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			
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		
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
Alpha coefficient	.90	.81	.82	.83	.88

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

Table 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

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, outdoor education, and technical skills with academic 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 (Tabachnick & Fidell, 2001). 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 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 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. An RMR value of zero indicates a perfect fit, thus a smaller RMR indicates a better fit. 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 = 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= 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). 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

The results of the confirmatory factor analysis are presented in Figure 1. 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 at $p < .001$. Excluding one item in the technical skill domain sub-scale (…demonstrate how to conduct a patient assessment), all item weights were above .7. Thus, considering the results of the fit 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 (α = .94), OCM (α = .92), TECH (α = .86), INT (α = .92), and ENV (α = .93).

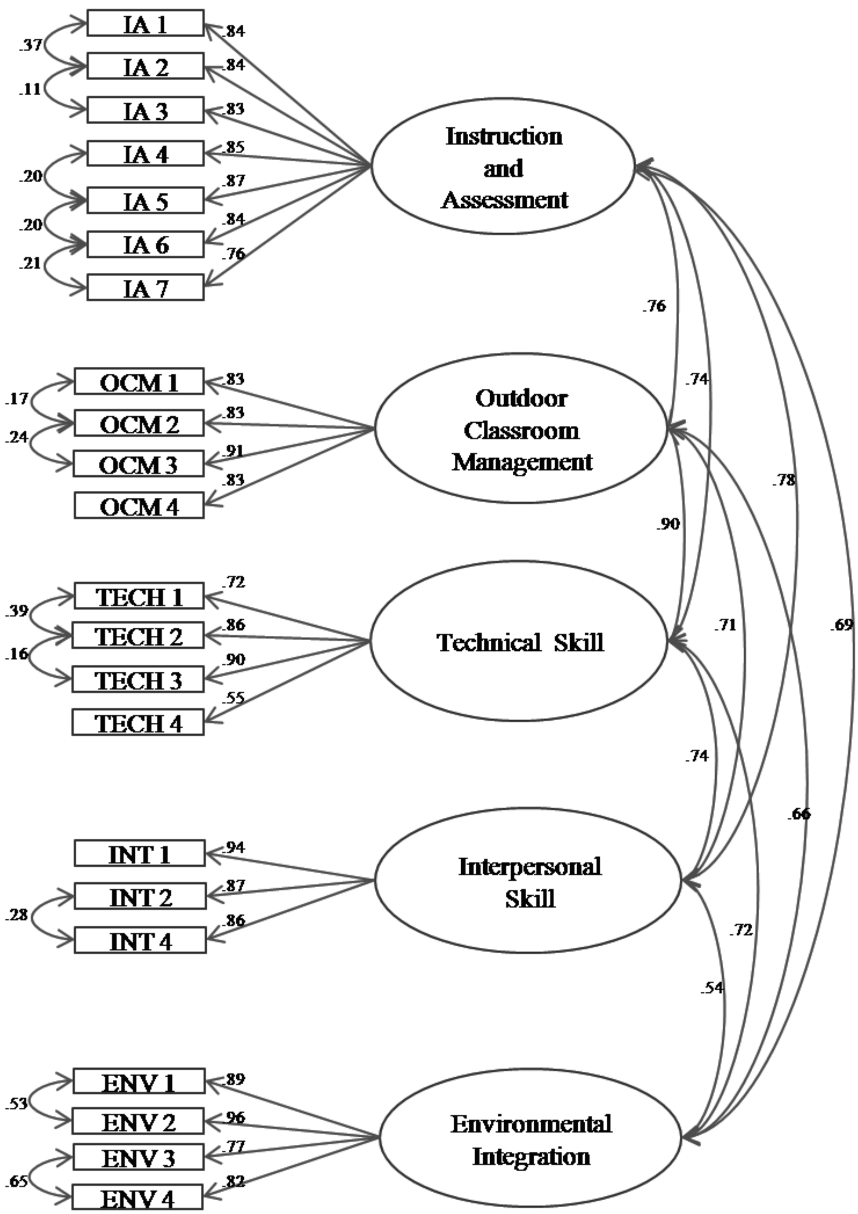

Figure 1. Confirmatory Factor Analytic Model for the TOE-SES 22

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. 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.

Table 3

Correlations 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

*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, five-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 during this 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. This is consistent with previous authors in outdoor education who 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 (Schumann, Sibthorp, & Hacker, in press). 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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