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A Multidimensional Assessment Model of Outdoor Learning Interventions: Investigating Student Achievement, Mental Health Outcomes, And Educator Well-Being in Experiential Education Settings

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ABSTRACT

Outdoor learning interventions have gained increasing scholarly attention as holistic educational strategies that integrate cognitive development, psychological well-being, and educator effectiveness within experiential learning environments. This study develops a multidimensional assessment model to evaluate the impact of outdoor education programs on student academic achievement, mental health outcomes, and educator well-being. Drawing upon established theoretical frameworks in experiential learning, teacher support systems, and psychological well-being research, the study synthesizes prior empirical findings to construct an integrated conceptual model. Structural equation modeling (PLS-SEM) principles are considered to ensure methodological robustness (Hair et al., 2017; Sarstedt et al., 2014). The model also incorporates validity and reliability assessment standards using Fornell & Larcker and HTMT criteria (Ab Hamid et al., 2017; Fornell & Larcker, 1981).

Findings from the synthesized literature suggest that outdoor education significantly enhances student engagement, resilience, and academic performance through immersive, nature-based learning experiences (Braun & Dierkes, 2016; Bogner, 2002). Furthermore, mental health outcomes are positively influenced by reduced academic stress and increased social-emotional support within outdoor settings (Atkins et al., 2010; Moore & Anderson, 2014). Educator well-being is also improved through experiential teaching environments that promote autonomy, reduced burnout, and job satisfaction (Zee & Koomen, 2016; Dreer, 2021).

The proposed multidimensional model highlights the interconnected role of pedagogical design, psychological safety, and environmental engagement in shaping educational outcomes. The study contributes to the growing body of research advocating for integrated outdoor learning systems as sustainable educational interventions. Limitations and future research directions are also discussed.

Keywords: Outdoor education, experiential learning, student achievement, mental health, teacher well-being, PLS-SEM, educational assessment model, learning environments, resilience, teacher support.

INTRODUCTION

Outdoor education has emerged as a transformative pedagogical approach that extends learning beyond traditional classroom boundaries into natural and experiential environments. The core philosophy of outdoor learning emphasizes direct interaction with nature, collaborative engagement, and problem-solving in real-world contexts. According to foundational perspectives in experiential education, meaningful learning occurs when students actively engage with their environment rather than

passively receiving information (Taniguchi et al., 2007). In this context, outdoor education programs are increasingly being adopted to enhance cognitive, emotional, and behavioral outcomes among learners.

A central concern in contemporary education systems is the declining levels of student engagement, mental well-being, and academic motivation. Research indicates that traditional instructional models often fail to address emotional and psychological dimensions of learning, leading to reduced academic performance and increased stress (Dogan, 2017; Honicke & Broadbent, 2016). Outdoor education interventions provide an alternative framework by integrating physical activity, environmental exposure, and collaborative learning experiences that foster holistic development (Bogner, 2002; Braun & Dierkes, 2016).

The importance of such interventions is further emphasized in studies highlighting the role of teacher-student interaction and supportive learning environments in shaping academic outcomes (Chong et al., 2018; Yu & Singh, 2018). Outdoor learning environments enable educators to adopt facilitative roles, enhancing student autonomy and engagement while simultaneously improving their own professional well-being (Zee & Koomen, 2016). As noted in experiential education literature, structured outdoor programs aim to achieve life effectiveness skills and broader developmental outcomes beyond academic achievement alone (Mcleod & Allen-craig, 2007).

Mental health concerns among students and educators have also become a critical focus in educational research. School-based stress, anxiety, and emotional disengagement are increasingly recognized as barriers to learning effectiveness (Shelemy et al., 2019; Atkins et al., 2010). Outdoor education programs offer a potential mitigating environment by promoting psychological resilience and emotional regulation through nature-based exposure and reduced cognitive overload (Moore & Anderson, 2014).

The primary objective of this study is to develop a multidimensional assessment model that evaluates the impact of outdoor education programs on three interconnected dimensions: student academic achievement, mental health outcomes, and educator well-being. The study further aims to synthesize existing literature into a structured analytical framework that can guide future empirical validation.

The significance of this research lies in its integrated approach. While previous studies have examined outdoor education outcomes in isolation—focusing either on academic performance, psychological health, or teacher satisfaction—this study proposes a unified model that captures their interdependencies. As emphasized in outdoor education program evaluations, it is essential to clearly define intended outcomes and assess whether educational interventions align with holistic developmental goals (Mcleod & Allen-craig, 2007).

LITERATURE REVIEW

The literature on outdoor education, student performance, and educator well-being reveals a complex and multidimensional relationship between learning environments and psychological outcomes. Outdoor education programs are widely recognized for their ability to enhance environmental awareness, cognitive engagement, and emotional development (Bogner, 2002; Braun & Dierkes, 2016). These programs emphasize experiential learning, where students actively construct knowledge through interaction with real-world environments.

A significant body of research supports the positive relationship between experiential learning and academic performance. Studies in educational data mining suggest that student achievement is influenced by behavioral, cognitive, and environmental factors (Abu, 2016; Zughoul et al., 2018). Outdoor education provides a dynamic learning environment that integrates these factors, thereby improving comprehension and retention.

The theoretical foundation of outdoor education is strongly aligned with experiential learning theory, which emphasizes learning through direct experience, reflection, and application. Mcleod and Allen-craig (2007) critically examine the intended outcomes of outdoor education programs, highlighting the importance of defining clear educational goals such as life skills development, resilience, and social competence. Their work underscores the need for systematic evaluation frameworks that go beyond surface-level academic outcomes.

Student mental health has also been extensively studied in relation to educational environments. Research indicates that supportive learning contexts significantly reduce

academic stress and improve emotional well-being (Atkins et al., 2010; Moore & Anderson, 2014). Outdoor education environments contribute to psychological restoration by reducing classroom-related pressure and enhancing social interaction. Additionally, mental health awareness programs in educational institutions have demonstrated improvements in student coping mechanisms and help-seeking behavior (Sontag-padilla et al., 2018).

Teacher well-being is another critical dimension in educational effectiveness. Studies show that teacher self-efficacy, job satisfaction, and emotional resilience are directly linked to classroom quality and student outcomes (Zee & Koomen, 2016; Dreer, 2021). Outdoor education programs can positively influence teacher well-being by reducing instructional rigidity and increasing autonomy in pedagogical practices. However, challenges such as workload adaptation and environmental uncertainty may also affect teacher experiences.

The integration of teacher support and student motivation has been widely recognized in educational psychology. Research demonstrates that teacher support enhances student engagement, self-efficacy, and academic emotions (Lei et al., 2018; Liu et al., 2021). Similarly, motivational resilience is strengthened when students perceive strong instructional and emotional support from educators (Pitzer & Skinner, 2017). Outdoor learning environments naturally facilitate such supportive interactions.

From a methodological perspective, structural equation modeling has become a standard approach for evaluating complex educational frameworks. The use of PLS-SEM allows researchers to assess relationships between latent variables such as engagement, well-being, and performance (Hair et al., 2017; Sarstedt et al., 2014). Validity assessment techniques such as Fornell-Larcker criterion and HTMT ratio ensure measurement reliability and discriminant validity in such models (Ab Hamid et al., 2017; Fornell & Larcker, 1981).

Despite extensive research, a key gap remains in the integration of student performance, mental health, and teacher well-being within a single analytical framework. Most studies treat these dimensions independently, limiting the ability to understand their interdependent effects. Mcleod and Allen-craig (2007) emphasize this gap by questioning the actual outcomes of outdoor education programs and calling for more comprehensive evaluation models that incorporate multiple stakeholder perspectives.

METHODOLOGY

This study adopts a conceptual analytical research design to develop a multidimensional assessment model for outdoor education interventions. The methodology is grounded in structural equation modeling principles, particularly Partial Least Squares Structural Equation Modeling (PLS-SEM), which is suitable for complex predictive models involving latent constructs (Hair et al., 2017; Sarstedt et al., 2014).

3.1 Research Framework Development

The proposed model integrates three primary constructs: student academic achievement, student mental health outcomes, and educator well-being. These constructs are influenced by outdoor education intervention quality, which is conceptualized as a multidimensional latent variable encompassing experiential learning intensity, environmental engagement, and instructional support.

The theoretical foundation is derived from experiential learning theory and educational psychology frameworks. Outdoor education outcomes are operationalized based on structured program objectives, as discussed by Mcleod and Allen-craig (2007), who emphasize clarity in defining intended educational outcomes such as resilience, life skills, and environmental awareness.

3.2 Measurement Model Design

Measurement indicators for each construct are derived from validated educational and psychological scales in the literature. Academic performance is conceptualized through cognitive achievement and engagement indicators (Abu, 2016). Mental health outcomes are measured through emotional well-being, stress reduction, and resilience indicators (Atkins et al., 2010). Educator well-being includes job satisfaction, emotional exhaustion, and teaching efficacy (Zee & Koomen, 2016).

Validity and reliability testing follows established criteria, including Fornell-Larcker discriminant validity and HTMT ratio analysis (Ab Hamid et al., 2017; Fornell & Larcker, 1981).

3.3 Data Analysis Approach

Although the model is conceptual, it is designed for empirical validation using PLS-SEM. This approach

enables simultaneous assessment of measurement and structural models. Mediation effects between constructs are evaluated using bootstrapping techniques (Zhao et al., 2010; Nitzl et al., 2016).

3.4 Ethical and Contextual Considerations

Outdoor education environments involve natural and social variability. Therefore, contextual adaptability is considered in model design. Teacher workload, environmental constraints, and student diversity are acknowledged as moderating variables affecting outcomes (Branand & Nakamura, 2017; Price & Mccallum, 2015).

RESULTS

The synthesized model indicates strong interrelationships between outdoor education interventions and the three primary outcome domains. First, student academic achievement is positively influenced by experiential engagement and environmental interaction. Studies consistently show that students exposed to outdoor learning environments demonstrate higher retention, motivation, and conceptual understanding (Braun & Dierkes, 2016; Bogner, 2002).

Second, mental health outcomes improve significantly in outdoor education settings due to reduced academic pressure and increased emotional regulation. Exposure to natural environments contributes to stress reduction and psychological restoration (Moore & Anderson, 2014). Additionally, supportive peer interactions enhance emotional stability and resilience (Shelemy et al., 2019).

Third, educator well-being is positively impacted through increased autonomy, reduced instructional rigidity, and improved teacher-student interaction quality. Teacher self-efficacy plays a central role in moderating these outcomes (Zee & Koomen, 2016). However, variability in implementation quality may lead to inconsistent outcomes across different educational settings.

The model also identifies indirect effects, where teacher support enhances student motivation, which in turn improves academic performance (Lei et al., 2018; Yu & Singh, 2018). These findings align with the theoretical assumptions of outdoor education effectiveness proposed by Mcleod and Allen-craig (2007), particularly the emphasis on holistic outcome evaluation.

DISCUSSION

The findings of this multidimensional model highlight the interconnected nature of cognitive, psychological, and professional outcomes in outdoor education systems. The integration of student achievement, mental health, and educator well-being reflects a shift from traditional performance-based evaluation to holistic educational assessment.

From a theoretical perspective, the results support experiential learning theory, which emphasizes learning through direct experience and reflection. Outdoor education serves as a catalyst for active learning, enabling students to develop cognitive and emotional competencies simultaneously. This aligns with previous findings that highlight the importance of engagement and self-efficacy in academic success (Honicke & Broadbent, 2016).

The role of mental health as a mediating factor is particularly significant. Reduced stress and enhanced emotional well-being contribute directly to improved academic outcomes. This supports broader educational psychology literature emphasizing the importance of emotional regulation in learning environments (Atkins et al., 2010; Moore & Anderson, 2014).

Teacher well-being emerges as a critical structural component influencing overall educational effectiveness. Educators who experience higher job satisfaction and emotional resilience are more effective in facilitating student engagement and learning outcomes (Dreer, 2021). However, implementation challenges such as environmental unpredictability and resource constraints may limit scalability.

A key implication of this study is the need for integrated evaluation frameworks in outdoor education. As highlighted by Mcleod and Allen-craig (2007), there is a persistent gap in clearly defining and measuring outdoor education outcomes. This study addresses that gap by proposing a unified model that captures multiple dimensions of educational impact.

Limitations include the conceptual nature of the model and the absence of empirical dataset validation. Future research should apply longitudinal designs and cross-cultural comparisons to enhance generalizability.

CONCLUSION

This study developed a multidimensional assessment model for evaluating outdoor education interventions across three key domains: student academic achievement, mental health outcomes, and educator well-being. The findings demonstrate that outdoor learning environments offer significant educational benefits by integrating cognitive, emotional, and professional dimensions of teaching and learning.

The study contributes to theoretical advancement by integrating experiential learning theory with structural evaluation methodologies. It also provides practical insights for educators and policymakers seeking to implement holistic educational programs.

Future research should focus on empirical validation using large-scale datasets and explore contextual moderators influencing program effectiveness. As emphasized by Mcleod and Allen-craig (2007), a clearer articulation of intended outcomes remains essential for improving the design and evaluation of outdoor education programs.

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