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Assessing students' low carbon literacy by Ridit IPA approach

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ABSTRACT

Low carbon literacy is an important issue in tourism and hospitality industries. However, previous research ignored the gap between realizations and ideals. This paper attempts to identify the importance and performance of low carbon literacy of tourism and hospitality students and discuss the current gap between the cognition and actual performance of students with low carbon literacy. *Ridit importance-performance analysis* was used to calculate the interval scores. Among the seven dimensions of low carbon literacy, *action intention* and *action strategy* are rated as “over-skilled”; *locus of control*, *ecological concept*, and *attitude and values* “required improvement,” and *sensitivity* and *knowledge* are “low priority.” The results provide a method to review the direction of current environmental education.

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1. Introduction

CO₂ emission from the three main subsectors of international and domestic tourism is estimated to be 4.0–6.0% of the total global emission in 2005 (UNWTO-UNEP-WMO, 2008). Hospitality and tourism industries contribute significantly to climate change through the use of fossil fuel and greenhouse gas emission, which are the principal causes of global warming (Scott, 2010). Among the sectors of these industries, transportation, accommodation, and other tourism activities account for approximately 5% of the total global CO₂ emission. Moreover, the total global tourism carbon footprint is estimated to be 1307 million tons compared with the total global emission of 26,400 million tons in 2009 (UNWTO, 2010). The percentage of total emission continues to increase with the rapid increase in tourism and hospitality activities in recent years. The tourism industry contributed significantly to the Kyoto Protocol framework. This industry not only generated global economic and social values but also influenced sustainable development because of its strong relationship with climate. Therefore, practitioners and educators should pay particular attention to social responsibility, ecological concepts, and environmental issues (Manaktola & Jauhari, 2007).

Coyle (2005) asserts that both environmental knowledge and literacy affect individual environmental behavior. Many studies have focused on energy conservation literacy over the past decades. DeWaters, Powers, and Graham (2007) defined the concept of energy literacy. Hungerford and Tomera (1985) proposed the environmental literacy model. Stables and

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Bishop (2001) and Pe'er, Goldman, and Yavetz (2007) discussed environmental literacy for the environment. Balgopal and Wallace (2009) employed cognitive-affective behavior writing to build a model that enhances ecological literacy. Becken, Frampton, and Simmons conducted research on energy consumption in the tourism and accommodation industries (Becken, Frampton, & Simmons, 2001; Becken & Simmons, 2002; Becken, Simmons, & Frampton, 2003). Teng, Horng, Hu, Chien, and Shen (2012) identified the energy conservation and carbon reduction indicators for the hotel industry. Horng et al. (2013) also developed a low carbon literacy (LCL) scale for the tourism industry. Researchers have attempted to create a measurable scale of environmental protection literacy; however, they ignored the gap between realizations and ideals. Educators or trainers must establish an appropriate plan for students or trainees. Therefore, comprehensive research must be conducted to understand the gap between realizations and ideals. Most studies focused on the application of literacy to specific disciplines; only a few focused on the confirmation of cognition and actual performance, and none focused on the integration of these subjects.

Festinger (1954) proposed cognitive dissonance theory and explained the relationship among cognitions. Psychological conflicts emerge when individuals face cognition dissonance (i.e., attitude, sense, and behavior). In such cases, individuals surrender or change one of their cognitions to fit the others and gain consonance. Cognitive dissonance in LCL among students may cause adjustments in LCL cognitions to obtain consonance. By contrast, the modification of consonance may cause misleading LCL. Cognitive dissonance theory provides methods to improve students' LCL and align it with the expectations of educators. The current study determines whether low-performance and low-importance dimensions or attributes would be distributed in the low-priority quadrant if LCL evaluation is based on student cognition.

LCL was applied to tourism and hospitality education in this study to understand the current status of students' LCL. This study aims to (1) explore the importance and performance of LCL, (2) discuss the gap between students' cognition and performance from cognitive dissonance theory perspectives, and (3) propose suggestions for the current problems in students' LCL in Taiwan. Information on and suggestions for improving LCL in tourism and hospitality education are also presented.

2. Literature review

2.1. LCL in tourism and hospitality education

With the increasing energy cost and abundant information from media broadcasting, energy conservation and carbon reduction have become issues in the education discipline. Many studies emphasized the importance of environmental cognition to human behavior in energy conservation (Dahle & Neumayer, 2001; Loozen & Moosdijk, 2001). Scholars believe that one of the effective methods to reduce global warming is for environmental education to change individuals' behavior. Yukata (2003) stated that energy conservation may not only reduce carbon dioxide emission but could also conserve energy. This statement highlights the importance of low carbon education. Moreover Morgan (2004) emphasized the social and environmental effect of tourism and the need for knowledge on sustainable development. However, related studies on energy conservation literacy and carbon reduction in the education discipline are rare.

The rapid increase in international tourism activities has caused similar developments in tourism education, which has an abundant demand for human talents. The first higher tourism and hospitality educational institute in Taiwan was established in 1965. By 2010, over 200 higher educational institutes and programs related to tourism, hospitality, and leisure have been established. Out of 149 higher educational institutes, 98 have tourism or hospitality-related departments (Department of Statistics, Ministry of Education, 2010). However, the characteristics of the hospitality industry involve many complex products and service procedures, frequent interaction with customers, and improvement of information technology. Therefore, hospitality educators must be skilled and knowledgeable professionals capable of delivering substantial information to students to fit the industry (Busby, 2001).

Environmental education sometimes strives for multidiscipline. Stables and Bishop (2001) indicated that individuals with high environmental literacy are most likely to acknowledge and adopt multiple views of the environment and understand complex environmental issues. *Environmental literacy* is "a measurable characteristic describing an individual's ability to understand, recognize, and interpret the health of all ecosystems composing the environment, and it uses information to take appropriate action to sustain those systems" (Morrone, Mancl, & Carr, 2001). Hungerford and Tomera (1985) proposed an environmental literacy model with eight variables, namely, ecological concept, locus of control, values, attitudes, problem of knowledge, beliefs, environmental sensitivity, and knowledge of environmental action strategies. They asserted that responsible environmental behavior is a learned action that develops in response to interacting components. Students can be informed about environmental problems to enable responsible environmental behavior. The model represents a simple, straight-line link among knowledge, attitude, and behavior. However Hungerford and Tomera (1985) stated that this link should be combined with multiple and complex relationships. They integrated factors, such as ecological concept, knowledge of issues, environmental action strategies, and environmental sensitivity, into attitude. Locus of control was added as another variable.

Based on a similar concept Horng, Hu, Teng, Hsiao, and Liu (2013) employed qualitative and quantitative methods to develop an LCL scale for the tourism industry in Taiwan. They defined LCL as the knowledge and understanding of energy conservation and carbon reduction and incorporated literacies into everyday life. They argued that LCL is a translation of environmental knowledge into a systematic understanding of the issues and knowledge concerning global warming and

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