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# **Millennials' Use of Technology in Nature-based Settings: Understanding Value Discrepancy with an Integrative Approach to Technology Acceptance and Attention Restoration Theory**

## **Introduction**

Researchers have expressed concerns about a growing tendency of younger generations spending less time in nature than past generations (Aaron & Witt, 2011; Louv, 2005). Aaron and Witt (2011) allege that the human cost of alienation from nature includes increased physical, mental, social, and health problems, reduced creativity, and attention difficulties. Further, lack of early exposure to nature may also lead to reduced environmental ethics and conservation stewardship. Given that some scholars see technology as an inhibitor of experiences with nature, the high usage and quick adoption of social media, smartphones, and other technologies among the millennial generation (Bolton et al., 2013) may fuel scholars' concern that young people are not having enough experiences in nature. As information and communication technology has revolutionized the travel experience (Navío-Marco, Ruiz-Gómez, & Sevilla-Sevilla, 2018), there is reason for nature-based tourism providers to be concerned with future management decisions and interactions with millennials.

Despite these concerns, many scholars argue that new technologies can enhance the outdoor experience with tools such as GPS, mobile maps, and satellite phones that can make exploring remote places safer in some respects (Ewert et al., 2006) and more enjoyable (Skinner, Sarpong, & White, 2018). Millennial travelers are high users of mobile phones which can aid international travelers to capture and share enjoyable experiences, have access translation services, and find information on tourist sites (Mang, Piper, & Brown, 2016). To investigate the type of technology use among millennials and their perceptions towards using technology while engaging in outdoor recreation, this study uses the Extended Unified Theory of Acceptance and Use of Technology (UTAUT2) (Venkatesh, Thong, & Xu, 2012) and Attention Restoration Theory (ART) (Izenstark, D. and Ebata, A. (2016). This study seeks to contribute to scholarly knowledge of millennials' views towards the use of technology in nature-based settings and whether differences exists between their views and nature-based tourism providers' views.

## **Literature Review**

There currently exists an abundance of literature discussing the impacts of technology on tourism (Neuhofer, Buhalis, & Ladkin, 2014), how millennials use technology while traveling (Mang, Piper., & Brown, 2016), factors associated with the adoption of new technologies (Davis, 1989; Venkatesh et al., 2003; Venkatesh, Thong, & Xu, 2012), and concerns about young people's interest in nature experiences (Louv, 2005; Smith & Kirby, 2015). As mobile technology continues to evolve and impact tourism experiences at deeper levels, recent research on smart tourism experiences (Femenia-Serra & Neuhofer, 2018) and smart destinations and smart tourists have come into popularity (Femenia-Serra, Neuhofer, & Ivars-Baidal, 2019). The evolution of technology brings new opportunities for outdoor enthusiasts (Skinner, Sarpong, & White, 2018) as well as much debate regarding how nature-based tourism attractions should accommodate new technologies and the tourist experiences these new technologies enable (Ewert et al., 2006). Since millennials have the most purchasing power of any age group (Chatzigeorgiou, 2017) and have a high propensity to travel (Cavagnaro, Staffieri, & Postma, 2018), understanding their needs and

travel habits in association with their use of technology will be beneficial for nature-based tourism providers.

Davis (1989) suggests that perceived ease of use and perceived usefulness are the major factors behind the technology acceptance model (TAM). Recognizing the limitations of the TAM model to explain how behavior and intention evolve over time, Venkatesh et al. (2003) developed the unified theory of acceptance and use of technology (UTAUT) by synthesizing eight models used in prior research, such as TAM, TAM2, Theory of Reasoned-Action (TRA), Theory of Planned Behavior (TPB), and several others (Venkatesh, Thong, & Xu, 2012). In order to explain technology adoption in a consumer context, Venkatesh, Thong, and Xu (2012) incorporate the constructs of habit and enjoyment into the UTAUT framework to form their UTAUT2 model, which demonstrates how the habits of older generations make it more difficult for them to adopt new technologies. In contrast to these models of technology acceptance is Attention Restoration Theory (ART), which posits that immersing oneself in nature and escaping the constant distraction of technology can have restorative effects on one's attention (Izenstark & Ebata, 2016).

## **Methodology**

The study used the data collected from a Web-based survey of millennials and parks and public sector nature-based tourism providers in Arizona, USA. A focus group was conducted with a group of 13 millennials prior to the surveys, which helped develop the instrument and understand the use of technology while participating in outdoor recreation activities. Both surveys included a list of questions to measure their perceptions of use of technology in nature-based settings, as well as a few questions related to technology and demographics. Millennials were recruited through social media (such as Facebook) and the sample included 100 millennials between the age of 18 and 36. For the providers survey, a list of 322 names and email addresses of local, state, tribal and federal nature-based tourism providers were developed with the help of land management agencies in Arizona. There were 176 surveys completed, resulting a final adjusted response rate of 54%.

## **Results**

Results of the independent sample t-test demonstrate a statistically significant mean difference between millennials and providers for six technologies out of ten, suggesting that providers and millennials' perceptions toward the use of technology in nature-based tourism activities differ (Table 1). Millennials' perception of the use of drones in nature-based settings is more positive ( $M=2.68$ ) than the providers' perception ( $M=2.09$ ). Similarly, the table shows that millennials perceived that playing music (iPod/MP3/MP4) enhances ( $M=3.25$ ) the outdoor experience more than managers did ( $M=2.70$ ). However, managers were significantly more lenient than millennials for using four types of technologies in nature-based settings, including laptop with wireless access, virtual augmented reality, video cameras, and Wi-Fi.

Frequency distributions from survey questions about the number of friends/followers on various social media networking sites demonstrate that most millennials use Facebook, followed by Instagram, Snapchat, Twitter, and Tumblr. The largest frequency category of number of Facebook friends is 601 or more, revealing millennials' relatively large social media networks. The results also show that millennials utilize social media to share their nature-based experiences with family and friends, but they tend not to use much social media while engaging in nature-based activities.

The findings imply that millennials use more social media after their nature-based experience than prior or during the trip.

*Table 1. Millennials and Providers Perceptions of use of Technology in Nature-based Tourism*

Use of Technology in outdoor	Groups						Mean Difference	
	Millennials			Providers			t	df
	M	SD	n	M	SD	n		
Talking on a cell phone	1.95	1.17	100	2.23	1.26	102	-1.613	200
Laptop with wireless access	1.77	1.08	99	2.64	1.29	101	-5.23***	193
Use of cell phone for internet access	2.72	1.24	99	3.01	1.23	101	-1.68	198
Virtual Augmented Reality (Earth View, Pokémon Go...)	2.02	1.24	100	2.55	1.14	98	-3.14**	196
Drones	2.68	1.31	100	2.09	1.12	101	3.42***	199
Digital Cameras	4.05	.88	100	4.24	.88	102	-1.50	200
Video Cameras	3.78	1.02	99	4.15	.91	101	-2.72**	199
iPod	3.25	1.15	100	2.70	1.23	98	3.23***	196
Wi-Fi at site	2.59	1.27	100	3.17	1.31	102	-3.17**	200
Global Positioning System (GPS)	4.07	1.09	100	4.23	1.03	100	-1.09	198

\*  $p < .05$ , \*\*  $p < .01$ , \*\*\*  $p < .001$

(1=diminish experience, 5=enhance experience)

## Conclusion and Discussion

This study makes several contributions to the literature on technology and nature-based tourism. The first contribution is a confirmation that millennials are indeed high users of social media, and that they do find certain technologies to enhance the outdoor experience, such as GPS and digital and video cameras. These findings support previous research about millennials' technology adoption (Venkatesh, Thong, & Xu, 2012) and use of certain technologies during travel (Mang, Piper, & Brown, 2016). A second contribution of this study is the finding that millennials desire enjoyment and balance while in nature, as seen by their use of enhancing technologies and aversion to instantly sharing their pictures on social media before returning from wilderness areas and using augmented reality while recreating outdoors. Finally, this study is the conceptualization of the discrepancy between millennials and outdoor recreation providers regarding their views towards technology use in nature. This discrepancy challenges existing literature about nature deficits among young people (Louv, 2005) and the notion that millennial travelers and consumers are more attached to technology than older generations and outdoor tourism providers are (Mang, Piper, & Brown, 2016), and also presents a possible shift in values among millennials favoring restorative experiences in nature to reduce stress and everyday distractions.

Millennials' desire to avoid potential distractions caused by technology use in nature fits well into Attention Restoration Theory, which emphasizes that by immersing oneself in nature and being free from normal everyday distractions, one can reduce mental fatigue and restore attentional functioning (Kaplan & Kaplan, 1989). Millennials emphasized this desire during focus groups discussions and portrayed it through their lower rating of laptop, Wi-Fi, and augmented reality usage during outdoor recreation. While previous studies demonstrate higher usage of technology

among millennials during travel and in consumer contexts (Mang, Piper, & Brown, 2016; Venkatesh, Thong, & Xu, 2012), millennials' negative perceptions of certain technologies in a nature-based setting sheds light on our understanding of millennials' travel and technology use.

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