

# HARMONIZING NATURE AND TECH: EXPLORING THE FUSION OF MOBILE TECHNOLOGY IN OUTDOOR ADVENTURE

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<https://doi.org/10.11118/978-80-7509-963-1-0153>

## Abstract

Mobile technology (tablets, smartphones) may provide students with access to educational resources (maps, navigation tools), enriching the outdoor adventure experience and facilitating the learning; therefore, the present study was aimed at exploring the fusion of mobile technology in outdoor adventure (in students). Instrument of survey (3 questions) was carried out 2 months (Jan. - Feb., 2024), through the sampling (purposive) of 1 624 (100%) students: (i) Male (846, 52.10 %); (ii) Female (778, 47.90%). Descriptive (percentage - %, arithmetic mean -  $\bar{x}$ ) and inferential (chi-square test -  $\chi^2$ ) statistics was used to evaluate the data. 62.80% (1020) of students use mobile technology in outdoor adventure; in contrast to 30.48% (495) (not using) ( $p > .05$ ). 36.82% (598) of students use additional devices of mobile technology (mobile apps) in outdoor adventure ( $p < .01$ ). 8.78 % (142) of students (only) are aware of apps, aimed at discovering the natural attractions ( $p > .05$ ). Exploring the fusion of mobile technology (apps) in outdoor adventure is students may promote the learning (experiential), engagement and environmental awareness, making it an important aspect of educational and/or outdoor recreation programs.

**Keywords:** Apps, education, health, students

## Introduction

Exploring the fusion of mobile technology in outdoor adventure is an interesting (exciting) journey at intersection of innovation and nature (Lindel, 2014). Mobile technology is revolutionizing the way we approach outdoor adventure (Crawford et al., 2016; Michalakakis et al., 2020), offering an abundance of tools to enhance learning, navigation, and/or enjoyment. Here are some important ways of fusion of mobile technology in outdoor adventure:

1. **Maps and Navigation** – Apps (mobile); in particular, Google Maps, Gaia Gps, provide detailed maps (real-time navigation), helping adventurers to stay on course and explore terrain (Schöning et al., 2007).
2. **Assurance and assistance** – Apps (Stay Safe, Cairn) allow adventurers to send signals (distress), share location with others (emergency contact) and access resources in case of emergency (Kamarudin, Salam, 2012).
3. **Health and fitness** – Devices (wearable) like smartwatches and trackers together with apps, allow adventurers to monitor heart rate, track activity levels, and analyze performance to optimize training (Shei et al., 2022).
4. **Education and experience** – Apps (Peak Visor, iNaturalist) provide the educational content about the local biology (fauna, flora), history, and/or geography, enhancing the experiences (outdoor) by offering insights into the natural environment (Unger et al., 2020).
5. **Conservation and maintenance** – Apps (Leave No Trace, Trail Karma) promote responsible outdoor recreation (practice) by providing guidelines for minimizing environmental impact and ways to return back to outdoor community (Simon, Alagona, 2009).

Mobile technology (tablets, smartphones) may provide students with access to educational resources (maps, navigation tools), enriching the outdoor adventure experience and facilitating the learning; therefore, the present study was aimed at exploring the fusion of mobile technology in outdoor adventure (in students - 1 624, 100%).

## Material and methods

In terms of study aim (see Introduction), the survey group (1 624, 100%) (target population) consisted of 778 (47.90%) adolescent boys and 846 (52.10%) girls, attending the 1st - 2nd years in high schools of Slovakia (Table 1). Adolescent boys (778, 47.90%) and girls (846, 52.10%) consisted of convenience sample, recruited by EduPage (Adamčák et al., 2023). Instrument of survey (3-question) was carried out 2 months (Jan. - Feb., 2024), through the sampling (purposive) of 1 624 (100%) students; regarding gender, year of study. Exploring the fusion of mobile technology (apps) in outdoor adventure (in students; see Introduction) was carried out in accordance with ethical standards as laid down in Declaration of Helsinki (1964) and its later amendments and comparable ethical standards. All subjects (1 624, 100% - students) provided written informed consent (Harriss et al., 2020).

Tab. 1: Demographic data of survey group (1 624, 100%)

Demographic data		
Boys	Age	15.80 ± .20 years
Girls		15.60 ± .20 years
Boys	Gender	778, 47.90%
Girls		846, 52.10%

Developing the instrument of survey (3 questions) made it easier to explore the fusion of mobile technology (apps) in outdoor adventure (in students) consisting of 2 sections:

1. **Demographic data** – Age, gender, year of study (Table 1).
2. **Survey items (3 questions)** – 3-question survey was online (available), collecting the data (Microsoft Forms, Office 365) (Table 2 - 4). 3-question survey was chosen because of its cost effectiveness, ease of access and time saving (Adamčák et al., 2023).

Available data (3-question survey) of 1 624 (100%) of students was tabulated in database design (Table 1 - 5). Each item (3) was analyzed and compared using the Tap3 – Gamo, B. Bystrica (Azor et al., 2023). Descriptive (arithmetic mean -  $\bar{x}$ , percentage - %), inferential (chi-square test -  $\chi^2$ ) ( $p < .01$ ,  $.05$ ) statistics was used to evaluate the data; in particular, between 778 (47.90%) adolescent boys and 846 (52.10%) girls (Singhal, Rana, 2015).

## Results

In terms of study aim (see Introduction), Table 2 illustrates (shows) whether 778 (47.90%) adolescent boys and 846 (52.10%) girls use apps (mobile) in outdoor adventure. 30.52% of students (1 624, 100%); in particular, 30.18% of boys and 30.84% of girls, do not use the apps (mobile) in outdoor adventure. Regular use of apps in outdoor adventure is reported by 20.96% of students and 41.76% of students report non-regular use of apps. In terms of outdoor adventure, 6.76% of students are “no active”.

Difference between 1 624 (100%) of students; in particular, 778 (47.90%) boys and 846 (52.10%) girls was insignificant (statistically,  $p > .05$ ) ( $p = .102$ ,  $\chi^2_{(3)} = 6.20$ ) (Table 2).

Tab. 2: Use of apps (mobile) in outdoor adventure (1 624, 100%)

Question 1			
	Boys	Girls	Boys + Girls
No use	30.18%	30.84%	30.52%
No active	6.22%	7.30%	6.76%
Regular use	18.70%	23.22%	20.96%
Non-regular use	44.90%	38.64%	41.76%
<b>P = .102; <math>\chi^2_{(3)} = 6.20</math></b>			

Table 3 illustrates the use of devices (smartwatch, tracker) in outdoor adventure in 1 624 (100%) students. 45.96% of students report “no use” of devices (40.50 % of boys, 51.40% of girls); “no active” in terms of outdoor adventure are 17.80 % of students. Non-regular use of devices in outdoor adventure report 21.90% of students and 14.34% of students report regular use of devices.

Difference between 1 624 (100%) of students; in particular, 778 (47.90%) boys and 846 (52.10%) girls was significant (statistically,  $p < .01$ ) ( $p = 2.64 \text{ E-}10$ ,  $\chi^2_{(3)} = 46.48$ ) (Table 3).

Tab. 3: Use of devices in outdoor adventure (1 624, 100%)

Question 2			
	Boys	Girls	Boys + Girls
No use	40.50%	51.40%	45.96%
No active	16.02%	19.58%	17.80%
Regular use	15.58%	13.10%	14.34%
Non-regular use	27.90%	15.92%	21.90%
<b>P = 2.64 E-10; <math>\chi^2_{(3)} = 46.48^{**}</math></b>			

\*\* -  $p > .01$ .

Table 4 illustrates the awareness of apps in outdoor adventure in 1 624 (100%) students. 8.78% of students (only) are aware of apps, aimed at discovering the natural attractions. 35.16% of students (1 624, 100%) do not know apps (any) in outdoor adventure and 26.28% of students heard of (some) apps; however, are unsure (uncertain) whether apps (some) are aimed at outdoor adventure. 29.78 % of students do not want to use apps (new) aimed at outdoor adventure.

Difference between 1 624 (100%) of students; in particular, 778 (47.90%) boys and 846 (52.10%) girls was insignificant (statistically,  $p > .05$ ) ( $p = .08$ ,  $\chi^2_{(3)} = 6.80$ ) (Table 4).

Tab. 4: Awareness of apps in outdoor adventure (1 624, 100%)

Question 3			
	Boys	Girls	Boys + Girls
No use	33.02%	26.52%	29.78%
Heard of	25.20%	27.36%	26.28%
Aware of	9.08%	8.48%	8.78%
Do not know	32.72%	37.64%	35.16%
<b>P = .08; <math>\chi^2_{(3)} = 6.80</math></b>			

## Discussion

Mobile technology (apps in smartphones) may provide students with access to educational resources (maps, navigation tools), enriching the outdoor adventure experience and facilitate the learning (experiential) (Lai et al., 2007); however, concerns arise, regarding overreliance on technology and its potential to detract from essence of outdoor exploration. Mobile technology (apps) enriches outdoor adventures by providing tools and/or resources. Apps (available - free) allow the students to navigate unfamiliar terrains, fostering independence and confidence (Cerino, 2021). Educational apps may offer insights into local fauna, flora, and/ or geological features, transforming hikes into interactive learning experiences (Unger et al., 2020). However, skeptics raise concerns about the encroachment of mobile technology (apps) on outdoor experiences. They argue that excessive screen time detracts from sensory immersion essential to outdoor adventures. Instead of engaging with surrounding, students may become fixated on screens, missing out the beauty and serenity of nature (Larson et al., 2019). Reliance on mobile technology (apps) poses risks; in particular, battery failure and/or loss of signal, compromising safety in remote areas. Maintaining the balance between mobile technology (apps) and nature is important in preserving the authenticity and spirit of outdoor exploration (Lindel, 2014).

## Conclusion

Exploring the fusion of mobile technology (apps) in outdoor adventure of 1 624 (100%) students (see Results) may promote learning (experiential), enthusiasm (engagement), and/or environmental awareness (Čipková et al., 2024), making it important aspects of educational and/or outdoor recreation programs.

By integrating mobile technology (apps) in outdoor adventure, adventurers may engage with surroundings, deepening the understanding of ecological principles and fostering senses of stewardship towards environment. Innovative approach empowers educators to adapt curriculum to modern learning styles, catering to digital natives of today, instilling appreciation of nature and outdoor exploration.

## References

- Adamčák, Š., Marko, M., Bartík, P. (2023). Physical (In)Activity Gender Gap of Slovak Non-athlete Adolescents. *Phys. Educ. Theory Method.*, 23(2): 283-289.
- Azor, S., Marko, M., Adamčák, Š. (2023). Adolescents' Smartphone Usage in Active Recreation and Natural Environment. *Public Recreation and Landscape Protection – with Environment Hand in Hand?* Brno, Czechia., May 9-11, 2023.
- Cerino, A. (2021). Importance of Recognizing and Promoting Independence in Young Children: Role of Environment and the Danish Forest School Approach. *Int. J. Early Years Educ.*, 51(4): 3-13.
- Crawford, M., Holder, M., Connor, B. (2016). Using Mobile Technology to Engage Children with Nature. *Envir. Behav.*, 49(9): 1-12.
- Čipková, E., Karolčík, Š., Fuchs, M., Vaněková, H. (2024). Slovak Science Teachers' TPACK and Their Attitudes Toward Educational Technologies. *J. Sci. Tea. Edu.*, 1(1): 1-27.
- Harriss, D., Jones, C., MacSwe, A. (2020). Ethical Standards in Sport, Exercise Science Research: 2022 Update. *Int. J. Sports Med.*, 43(13): 1065-1070.
- Kamarudin, N., Salam, S. (2012). Enabling Mobile Location Based Services for Emergency Cases. *Conference on Research Innovation in Information Systems Kuala Lumpur, Malaysia.* November 23-24, 2012.
- Lai, C., Yang, J., Chen, F., Chan, T. (2007). Affordances on Mobile Technology for Experiential Learning: Interplay of Technology and Pedagogical Practice. *J. Comput. Assist.*, 23(4): 326-337.
- Larson, L., Szczytko, R., Bowers, E., Stephens, L., Stevenson, K. (2019). Out-door Time, Screen Time, and Connection to Nature: Troubling Trends Among Rural Youth? *Envir. Behav.*, 51(8): 966-991.
- Lindel, S. (2014). Reconciling technology and nature: Use of Mobile Technology in Outdoor Recreation. *Graduate School Collection: Wester W. University.* 121.
- Michalakakis, V., Vaitis, M., Klonar, A. (2020). Development of an Educational Out-door Adventure Mobile App. *Educ. Sci.*, 10(12): 1-22.
- Schöning, J., Rohs, M., Martin, R., Essl, G., Krüger, A. (2007). Map Navigation with Mobile Devices: Virtual Versus Physical Movement with and without Visual Context. *9th International Conference on Multimodal Interfaces.*, Nagoya, Japan. November 12-15.
- Shei, J., Holder, G., Oumsang, S., Paris A., Paris, H. (2022). Wearable Activity Trackers-advanced Technology or Advanced Marketing? *Eur. J. Appl. Physiol.*, 122(9): 1975-1990.
- Simon, G., Alagona, P. (2009). Beyond Leave No Trace. *Ethic Pla. Envir.*, 12(1): 17-34.
- Singhal, R., Rana, R. (2015). Chi-square Test and Its Implication in Hypothesis Testing. *J. Cardiovasc. Dis. Res.*, 1(1): 69-71.
- Unger, S., Rollins, M., Tietz, A., Dumais, H. (2020). iNaturalist as an Engaging Tool for Identifying Organisms in Outdoor Activity. *J. Biol. Educ.*, 55(1):537-547.

## Acknowledgement

The authors thank 1 624 (100%) students who agreed (voluntarily) to participate in our study, receiving no specific grant from any funding agency in commercial, public, and/or not-for-profit sectors.

## Souhrn

Mobilní technologie (tablety, chytré telefony) mohou studentům poskytnout přístup ke vzdělávacím zdrojům (mapy, navigační nástroje), obohatit zážitek z outdoorového dobrodružství a usnadnit učení; proto byla tato studie zaměřena na zkoumání spojení mobilních technologií v outdoorovém dobrodružství (u studentů). Nástroj průzkumu (4 otázky) byl prováděn 2 měsíce (leden - únor 2024), a to prostřednictvím výběru vzorku (účelového) 1 624 (100 %) studentů: (i) mužů (846, 52,10 %); (ii) žen (778, 47,90 %). K vyhodnocení dat byla použita deskriptivní (procenta - %, aritmetický průměr -  $\bar{x}$ ) a inferenční (chí-kvadrát test -  $\chi^2$ ) statistika. 62,80 % (1020) studentů používá mobilní technologie při dobrodružství v přírodě; na rozdíl od 30,48 % (495) (nepoužívá) ( $p > .05$ ). Další zařízení mobilních technologií (mobilní aplikace) využívá při outdoorovém dobrodružství 36,82 % (598) studentů ( $p < .01$ ). Mobilní aplikace, zaměřené na zdraví, zná při outdoorovém dobrodružství (pouze) 8,80 % (142) studentů ( $p < .01$ ). Zkoumání spojení mobilních technologií (aplikací) v outdoorovém dobrodružství u studentů může podpořit

učení (zážitkové), zapojení a environmentální povědomí, což z něj činí důležitý aspekt vzdělávacích a/nebo outdoorových rekreačních programů.

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