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Enhancing Environmental Awareness through Digital Tools in Environmental Education in China

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Abstract
This study examines the impact of digital interactivity on environmental education among Chinese college students, focusing on how digital tools enhance environmental knowledge, attitudes, and behavioral intentions towards conservation. Employing quantitative methods, it finds significant relationships between the use of digital platforms and increased environmental awareness, positive attitudes, and intentions to engage in pro-environmental behaviors. The research highlights the need for integrating digital technologies in environmental education to foster a generation of environmentally conscious individuals.

Keywords: Interactivity of Digital Tools, Environmental Knowledge and Awareness, Attitudes towards Environment, Behavioral Intentions

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1.0 Introduction

Global industrial growth has led to environmental crises like deforestation, erosion, water scarcity, and biodiversity loss, demanding urgent action and greater public involvement in sustainable practices. Addressing these issues requires behavioral change, emphasizing the crucial role of environmental education in cultivating awareness, ethical responsibility, and conservation-oriented attitudes (Christensen et al., 2023).

China's government has recognized the vital role of education in empowering young people as active environmental problem-solvers. Studies indicate that Chinese youth possess limited environmental awareness, necessitating a reevaluation of educational strategies to amplify its effectiveness and tailor it to cultivate environmental literacy and action (Zhang et al., 2020) .Traditional forms of media are losing their grip on the youth, who are turning towards Web 2.0 tools for information and engagement on environmental issues. These digital platforms offer dynamic, interactive modes of learning and problem-solving, which are proving to be more effective in fostering participation compared to conventional media (Balińska et al., 2021).

Knowledge and awareness are crucial, with studies indicating that well-informed individuals are more likely to engage in pro-environmental behaviors (Wang et al., 2023). Additionally, positive attitudes towards the environment, shaped by knowledge and societal norms, have been proven to increase the likelihood of undertaking actions beneficial to the environment. Moreover, behavioral intentions serve as a bridge between knowledge and action, significantly predicting actual environmental behaviors. Furthermore, researchers

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believe that education plays a vital role in this ecosystem, not only in imparting knowledge but also in shaping attitudes and behaviors to establish a responsible society ready to tackle environmental challenges through personal responsibility and collective action. Despite the abundance of research (Li et al., 2023; Rasiah et al., 2023), few studies have integrated English education curricula with digital tools to promote students' environmental awareness in a personalized manner through smartphones (Thor & Karlsudd, 2020).

The study will bridge the existing research gap by focusing on the interplay between digital interactivity, knowledge, awareness, attitudes, and behavioral intentions towards the environment, with a specific emphasis on college students as the subject group.

Based on the content above, this study proposes the following hypothesis:

$H_0$1：Attitudes Towards Environment have no significant effect on Behavioral Intentions.
$H_0$2：Environmental Knowledge and Awareness have no significant effect on Attitudes Towards Environment.
$H_0$3：Environmental Knowledge and Awareness have no significant effect on Behavioral Intentions.
$H_0$4：Interactivity of Digital Tools have no significant effect on Attitudes Towards Environment.
$H_0$5：Interactivity of Digital Tools have no significant effect on Environmental Knowledge and Awareness.

2.0 Literature Review

The interplay between digital tools and environmental education is a burgeoning field of study, crucial for addressing the environmental challenges of the 21st century (Perry, 2018; Tu et al., 2012). This literature review delves into the nuanced relationship among digital interactivity, environmental knowledge and awareness, attitudes towards the environment, and behavioral intentions. By doing so, it aims to illuminate the complex dynamics that digital tools introduce into the traditional landscape of environmental education, focusing on their potential to foster a more profound and actionable understanding of environmental issues among Chinese college students.

2.1 Theory Framework

Grounded in established behavioral, psychological, and cognitive theories, this research particularly draws upon the Theory of Planned Behavior (TPB) (Ajzen, 1991), positing that human behavior is driven by a well-considered plan, highlighting the importance of attitudes, subjective norms, and perceived behavioral control in shaping behavioral intentions and, ultimately, behaviors themselves. The current lack of TPB based research in digital contexts leads to a poor understanding of how environmental education integrated with digital tools enhance specific factors that influence employees' pro-environmental behaviors. In this study, the application of TPB within the context of internet use for environmental education offers a promising avenue for identifying key beliefs and determinants of pro-environmental behavior.

2.2 Interactivity of Digital Tools and Environmental Education

Digital tools, characterized by their interactive nature, have transformed the way educational content is delivered and consumed. Past study underscores the significant role that different media sources, especially social media, play in propagating environmental awareness and driving environmental action among the youth, positioning it as a pivotal element in nurturing an environmentally conscious society (Boulianne et al., 2020).

Unlike traditional media, these tools facilitate a two-way interaction that can significantly enhance learning outcomes. Balińska et al.(2021) emphasize the role of Web 2.0 technologies in engaging students more deeply with environmental content. By allowing users to interact with information in dynamic ways, such as through simulations or participatory platforms, digital tools can offer more personalized and impactful learning experiences. This interaction not only aids in the comprehension of complex environmental issues but also encourages critical thinking and problem-solving skills essential for environmental stewardship.

2.3 Environmental Knowledge and Awareness through Digital Platforms

Environmental Awareness encompasses recognizing the importance of the physical environment and making choices that benefit its preservation (Fromm, 2023). The foundation of effective environmental education lies in the development of comprehensive environmental knowledge and awareness. Sinakou et al.（2018) highlight the importance of understanding environmental issues deeply, which is crucial for motivating individuals towards pro-environmental behaviors. The research carried out among students showed that the low level of environmental awareness results from a lack of knowledge and lack of reliable sources of information. Digital platforms, with their vast reach and accessibility, play a pivotal role in disseminating environmental knowledge. They offer diverse resources that can cater to different learning styles and preferences, making environmental education more inclusive and effective.

2.4 Shaping Attitudes towards the Environment

Milfont and Duckitt (2010) define Environmental Attitudes (EA) as a psychological tendency to evaluate the natural environment with some degree of favor or disfavor. Attitudes towards the environment are significantly influenced by the knowledge and awareness individuals possess. As Milfont & Duckitt (2010) argue, environmental attitudes encompass one's evaluations of the natural environment, which can either favor or disfavor conservation efforts. Digital tools have the unique capability to not only inform but also inspire and mobilize (Boulianne et al., 2020). Through engaging storytelling, interactive content, and community discussions, these platforms can influence attitudes by highlighting the value of the natural world and the impact of individual actions on environmental health. This shaping of attitudes is crucial for preparing the ground on which behavioral intentions to engage in pro-environmental actions can grow.

2.5 Behavioral Intentions and Digital Engagement

Behavioral intention is defined as a strong internal stimulus and is often understood as the cause of behaviors (Moisander, 2007). Hines et al.(1987) introduced the model of responsible environmental behavior, proposing that possessing appropriate environmental attitudes and knowledge can lead to an increased intention to act in an environmentally friendly manner. This notion is echoed in Theory of Planned Behavior, which posits that holding positive attitudes and beliefs towards an action enhances the probability of executing the actual pro-environmental behavior. Hines et al.(1987) and the Theory of Planned Behavior (Ajzen, 1991) both underscore the importance of attitudes, knowledge, and perceived control in shaping these intentions. Digital tools, by providing personalized and actionable information, can bridge the gap between passive knowledge and active intention. They offer platforms for pledge-making, community action, and engagement in conservation efforts, which can translate environmental concern into concrete intentions to act. This study aims to research on intention rather than actual behaviors as it is not practical to measure actual separate collection behaviours (Rhodes & de Bruijn, 2013). Hines et al.(1987) and Möser & Bamberg (2008) indicated behavioral intention as the determinant of PEB and attitude as explaining variables of intention.

2.6 The Integrated Framework of Digital Tools in Environmental Education

This literature review suggests an integrated framework where digital interactivity enhances *environmental* knowledge and awareness, which in turn shapes positive attitudes towards the environment. These attitudes foster the formation of behavioral intentions, culminating in the adoption of pro-environmental behaviors (Cutter-Mackenzie & Rousell, 2019). By engaging with this framework, the study seeks to explore the nuanced role of digital tools in not only transmitting information but also in cultivating a generation of informed, concerned, and active environmental stewards.

In summary, the interconnectivity between digital interactivity, environmental knowledge and awareness, attitudes towards the environment, and behavioral intentions forms a cohesive narrative. This narrative underscores the transformative potential of digital tools in environmental education, aiming to foster a deeper understanding and commitment to environmental conservation among Chinese college students (Krouska et al., 2022).

3.0 Methodology

This study employs a cross-sectional design within quantitative methods to explore how digital platforms can serve as a transformative medium for fostering environmental consciousness among the youth. The target population for this research comprised English majors from various colleges in Shanxi Province, China. This demographic was chosen due to its potential exposure to both traditional and digital forms of education, making it an ideal subject group. A sample size of 384 students was determined necessary according to small sample techniques outlined by Krejcie & Morgan (1970). Data were collected through a questionnaire survey based on existing literature conducted on the Wenjuanxing platform to ensure comprehensiveness and relevance to the study's objectives. Thereby addressing the issue of engaging participants effectively in the digital environment.

The methodology was specifically designed to address the issue of limited engagement and effectiveness of traditional environmental education approaches among Chinese college students. The quantitative approach enables the investigation of significant relationships between the use of digital platforms and environmental education outcomes, providing empirical evidence to support the development of more effective educational strategies.

4.0 Findings

4.1 Conceptual Framework

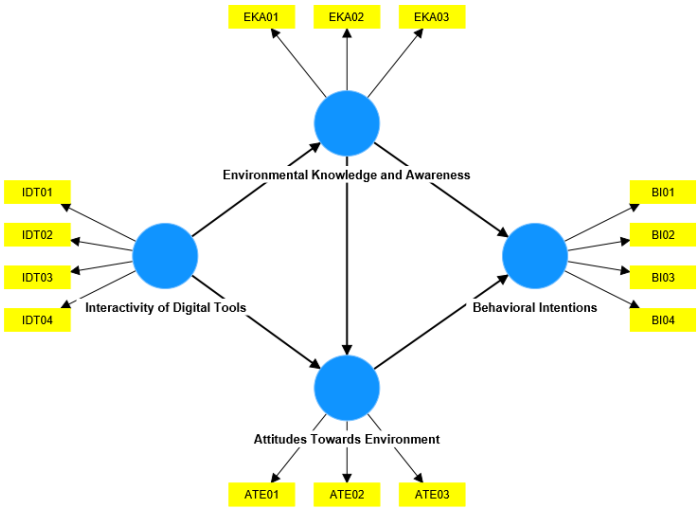

Fig. 1: Conceptual framework
(Source: Authors, 2024)

The conceptual framework in the image outlines the hypothesized relationships between the interactivity of digital tools, environmental knowledge and awareness, attitudes towards the environment, and behavioral intentions. Arrows connect the nodes, depicting assumed pathways of influence. The model suggests that the way digital tools are used can directly influence people's knowledge and awareness of environmental issues and their attitudes towards the environment, which in turn can influence their behavioral intentions related to the environment. The framework provides a structured approach to studying how digital technology impacts environmental consciousness and behavior.

4.2 Data Analysis and Findings

Table 1. Mean, standard deviation, and loadings of items

Items		Mean	SD	Loadings
Behavioral Intentions	BI01 I plan to reduce my carbon footprint by using public transportation or carpooling.	3.30	1.40	0.890
	BI02 I will consider environmental impacts when making purchasing decisions.	3.37	1.45	0.902
	BI03 I am committed to reducing my energy consumption by using energy-efficient appliances.	3.26	1.49	0.884
	BI04 I am willing to volunteer for environmental conservation activities.	2.96	1.46	0.885
Attitudes Towards Environment	ATE01 I feel a personal responsibility to take care of the environment.	4.20	1.56	0.924
	ATE02 I believe individual actions can significantly impact environmental conservation.	3.93	1.48	0.947
	ATE03 I think that environmental protection is more important than economic growth.	3.81	1.44	0.933
Interactivity of Digital Tools	IDT01 The digital tools I use allow me to actively engage with environmental content.	4.13	1.44	0.923
	IDT02 I am able to customize my learning experience about the environment using these digital tools.	4.06	1.51	0.935
	IDT03 I find that the digital tools provide a high level of interactivity when learning about environmental issues.	4.12	1.44	0.932
	IDT04 The digital tools I use provide immediate feedback on my actions regarding environmental education.	4.25	1.52	0.901
Environmental Knowledge and Awareness	EKA01 I understand the global impact of my local environmental actions.	4.00	1.48	0.936
	EKA02 I am well-informed about local environmental issues.	4.23	1.52	0.938
	EKA03 I am aware of the most pressing environmental challenges today.	4.06	1.46	0.934

(Source: Authors, 2024)

In Table 1, all item loadings for Behavioral Intentions, Attitudes Towards Environment, Interactivity of Digital Tools, and Environmental Knowledge and Awareness surpass the 0.708 benchmark, implying robust item reliability and suggesting that each construct explains a significant portion of its indicators' variance. Mean values are positively skewed, particularly for Attitudes Towards Environment, indicating a strong agreement with environmental responsibility.

Interactivity of Digital Tools highlights the role of technology in fostering environmental education and engagement. The ability to actively engage with environmental content through digital tools (mean=4.13, SD=1.44, loading=0.923) and to customize learning experiences (mean=4.06, SD=1.51, loading=0.935) received high marks, pointing to the effectiveness of these platforms in enhancing understanding and awareness. The provision of immediate feedback on environmental actions (mean=4.25, SD=1.52, loading=0.901) further emphasizes the potential of digital tools to encourage positive environmental behaviors.

Awareness of the global impact of local environmental actions (mean=4.00, SD=1.48, loading=0.936), being well-informed about local issues (mean=4.23, SD=1.52, loading=0.938), and understanding the pressing environmental challenges of today (mean=4.06, SD=1.46, loading=0.934) indicate a high level of environmental literacy among the surveyed individuals.

Participants expressed a positive attitude towards care for the environment (mean=4.20, SD=1.56, loading=0.924) and a belief that individual actions can significantly influence environmental conservation (mean=3.93, SD=1.48, loading=0.947). The valuation of environmental protection over economic growth (mean=3.81, SD=1.44, loading=0.933) also underscores a prioritization of long-term ecological well-being over short-term economic gains.

Notably, intentions to consider environmental impacts in purchasing decisions (mean=3.37, SD=1.45, loading=0.902) and commitment to using energy-efficient appliances (mean=3.26, SD=1.49, loading=0.884) scored highly, indicating a strong sense of responsibility towards reducing personal carbon footprints. However, the willingness to volunteer for environmental conservation (mean=2.96, SD=1.46, loading=0.885) lagged slightly behind, suggesting an area that could benefit from increased encouragement and opportunities.

Overall, the results shed light on the multifaceted dimensions of environmental consciousness, with strong attitudes towards the environment and significant environmental knowledge and awareness standing out as areas of strength. Meanwhile, behavioral intentions, particularly volunteering for conservation efforts, present opportunities for further engagement and improvement. The interactivity of digital tools emerges as a powerful facilitator for learning and action, suggesting that leveraging technology could amplify efforts towards environmental sustainability.

Table 2. Reliability and validity

Indicator	Cronbach's alpha	rho_a	rho_c	AVE	Heterotrait-Monotrait (HTMT)			
Variables					ATE	BI	EKA	IDT
ATE	0.928	0.928	0.954	0.874				
BI	0.913	0.914	0.938	0.792	0.608			
EKA	0.933	0.933	0.957	0.881	0.783	0.534		
IDT	0.942	0.943	0.958	0.852	0.876	0.516	0.815	

(Source: Authors, 2024)

Table 2's PLS-SEM analysis reveals high internal consistency across constructs, with Cronbach's alpha ranging from 0.913 to 0.942 and composite reliability between 0.938 to 0.958, surpassing the 0.70 benchmark and staying well below the 0.95 limit that suggests redundancy. The Average Variance Extracted (AVE) values, spanning 0.792 to 0.881, affirm strong convergent validity by explaining over 50% of the variance for each construct. Furthermore, Heterotrait-Monotrait (HTMT) ratios below the 0.85 threshold demonstrate that the constructs are conceptually distinct, ensuring robust discriminant validity (Hair et al., 2019).

The VIF scores for individual indicators range from 2.735 to 4.505, all below the critical threshold of 5, indicating no significant collinearity issues within the PLS-SEM model. Construct-level VIF scores between different constructs are also well below the concern level, with scores as low as 1.000 and not exceeding 2.409. These results suggest that the model is free from collinearity problems, affirming the structural model's integrity and the reliability of regression results (Hair et al., 2019).

Table 3. R-square, F-square and Q-square of variables

Indicator	R-square	R-square adjusted	F-square			Q-square
Variables			ATE	BI	EKA	
ATE	0.697	0.696		0.127		0.671
BI	0.329	0.327				0.226
EKA	0.585	0.584	0.082	0.023		0.582
IDT			0.549		1.409	

(Source: Authors, 2024)

Table 3 presents R-square, R-square adjusted, F-square, and Q-square values for the variables ATE (Attitudes Towards Environment), BI (Behavioral Intentions), EKA (Environmental Knowledge and Awareness), and IDT (Interactivity of Digital Tools). ATE exhibits strong predictive power with an R-square of 0.697, closely mirrored by its adjusted R-square of 0.696, and a significant impact on BI and EKA with F-square values of 0.127 and 0.082, respectively. BI shows a moderate R-square of 0.329, indicating a fair level of explained variance, and EKA's R-square at 0.585 suggests substantial explained variance with impacts from ATE and IDT. IDT's significant influence on EKA is highlighted by an F-square of 1.409. The Q-square values, indicating the model's predictive relevance, are positive for ATE (0.671), BI (0.226), and EKA (0.582), supporting the model's predictive capability (Hair et al., 2019). According to the document, these values surpass the thresholds for acceptable model fit and predictive relevance, affirming the model's robustness and validity in capturing the relationships among the constructs.

Table 4. Path coefficients

Hypotheses	Path	O	M	SD	T values	P values	CIs		Results
$H_0$1	ATE→BI	0.426	0.428	0.055	7.762	0.000	0.320	0.534	Supported
$H_0$2	KEA→ATE	0.245	0.243	0.065	3.743	0.000	0.117	0.373	Supported
$H_0$3	EKA→BI	0.183	0.182	0.050	3.665	0.000	0.084	0.280	Supported
$H_0$4	IDT→ATE	0.633	0.635	0.061	10.303	0.000	0.512	0.754	Supported
$H_0$5	IDT→EKA	0.765	0.765	0.028	27.164	0.000	0.706	0.817	Supported

(Source: Authors, 2024)

In the PLS-SEM analysis, all five hypotheses are supported with significant path coefficients. Specifically, Attitudes Towards Environment (ATE) strongly predicts Behavioral Intentions (BI) with a coefficient of 0.426, and Environmental Knowledge and Awareness (EKA) influences both ATE and BI with coefficients of 0.245 and 0.183, respectively. Interactivity of Digital Tools (IDT) demonstrates a particularly strong effect on both ATE and EKA, with path coefficients of 0.633 and 0.765. The P values for all hypotheses are 0.000, indicating highly significant results. These substantial findings underscore the robustness of the structural model, confirming that the paths between constructs are statistically significant and the model is well-specified.

5.0 Discussion

The findings of this study significantly contribute to the discourse on environmental education, particularly within the Chinese context, illustrating the transformative potential of digital tools in enhancing environmental consciousness among college students. This research provides empirical evidence supporting the integration of digital platforms in educational strategies aimed at fostering pro-environmental behaviors.

The significant relationship between attitudes towards the environment and behavioral intentions (H01) underscores the pivotal role of internalized environmental responsibility in motivating pro-environmental actions, aligning with TPB's (Ajzen, 1991) emphasis on the attitudinal determinants of behavior.

Furthermore, the positive effects of environmental knowledge and awareness on attitudes towards the environment (H02) and behavioral intentions (H03) highlight the critical role of informed consciousness in shaping both the cognitive and affective dimensions of environmental engagement. This aligns with previous research indicating that well-informed individuals are more likely to engage in behaviors that benefit the environment (Debrah et al., 2021).

The robust influence of digital tool interactivity on both environmental knowledge and awareness (H05) and attitudes towards the environment (H04) underscores the transformative power of digital technologies in environmental education. By facilitating dynamic interaction and personalized learning experiences (Zgheib & Dabbagh, 2020), digital platforms serve as effective tools for engaging students with environmental content, thereby enhancing both their understanding and valuation of environmental conservation efforts.

The study's findings hold significant implications for the design and implementation of environmental education programs, especially in contexts like China, where traditional educational approaches have struggled to engage youth effectively. The demonstrated effectiveness of digital tools in fostering environmental consciousness suggests that educators and policymakers should prioritize the integration of digital technologies into environmental curricula and educational institutions can provide more engaging, relevant, and impactful learning experiences that resonate with the digital-native generation.

Moreover, by facilitating immediate feedback and active engagement with environmental issues, digital platforms can help students translate their knowledge and attitudes into concrete behavioral intentions and actions, thereby contributing to the development of a more environmentally responsible society.

While this study focuses on Chinese college students, its implications extend beyond this demographic and geographical context. The increasing ubiquity of digital technologies worldwide suggests that the insights gained from this research are relevant to environmental education efforts globally. As countries around the world grapple with environmental challenges, the integration of digital tools in educational strategies offers a promising avenue for cultivating a globally conscious generation equipped to tackle these issues.

Additionally, this research invites further exploration into the specific features and functionalities of digital tools that are most effective in promoting environmental consciousness. Future studies could investigate the role of gamification, virtual reality, and social media in enhancing environmental education outcomes, providing valuable insights for the development of more sophisticated and impactful digital learning tools.

6.0 Conclusion & Recommendations

This study highlights the critical role of digital interactivity in enhancing environmental education and shaping pro-environmental behaviors among English majors. The findings suggest that integrating digital tools with environmental curricula can significantly improve knowledge, attitudes, and intentions toward environmental conservation. However, the study's scope, limited to English majors in Shanxi Province, calls for broader research across various demographics to validate these results. Future trends should focus on leveraging emerging digital technologies to further engage students in environmental issues, fostering a globally conscious generation ready to address environmental challenges. Recommendations include expanding the integration of digital tools in environmental education and conducting longitudinal studies to assess the long-term impact of these interventions on pro-environmental behavior (Ibrahim et al., 2023) .

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Paper Contribution to Related Field of Study

This study contributes to a deeper understanding of the potential of digital technologies to enhance environmental education and foster a generation of environmentally conscious individuals. This research underscores the need for a paradigm shift in environmental education, towards more interactive, engaging, and effective approaches.

References

Ajzen, I. (1991). The theory of planned behavior. *Organizational Behavior and Human Decision Processes*, *50*(2), 179–211.

Balińska, A., Jaska, E., & Werenowska, A. (2021). The role of eco-apps in encouraging pro-environmental behavior of young people studying in Poland. *Energies*, *14*(16), 4946.

Boulianne, S., Lalancette, M., & Ilkiw, D. (2020). " School Strike 4 Climate": Social Media and the International Youth Protest on Climate Change. *Media and Communication*, *8*(2), 208–218.

Christensen, P., Keiser, D. A., & Lade, G. E. (2023). Economic effects of environmental crises: Evidence from Flint, Michigan. *American Economic Journal: Economic Policy*, *15*(1), 196–232.

Cutter-Mackenzie, A., & Rousell, D. (2019). Education for what? Shaping the field of climate change education with children and young people as co-researchers. *Children's Geographies*, *17*(1), 90–104.

Debrah, J. K., Vidal, D. G., & Dinis, M. A. P. (2021). Raising awareness on solid waste management through formal education for sustainability: A developing countries evidence review. *Recycling*, *6*(1), 6.

Fromm, M. T. (2023). 'Great Northern Wilderness'-style environmentalism: Nature preservation and the legacies of Mao-era land reclamation in China's northeast borderland. *Modern Asian Studies*, 1–21.

Hair, J. F., Risher, J. J., Sarstedt, M., & Ringle, C. M. (2019). When to use and how to report the results of PLS-SEM. In *European Business Review* (Vol. 31, Issue 1, pp. 2–24). Emerald Group Publishing Ltd. https://doi.org/10.1108/EBR-11-2018-0203

Hines, J. M., Hungerford, H. R., & Tomera, A. N. (1987). Analysis and synthesis of research on responsible environmental behavior: A meta-analysis. *The Journal of Environmental Education*, *18*(2), 1–8.

Ibrahim, R. L., Huang, Y., Mohammed, A., & Adebayo, T. S. (2023). Natural resources-sustainable environment conflicts amidst COP26 resolutions: investigating the role of renewable energy, technology innovations, green finance, and structural change. *International Journal of Sustainable Development & World Ecology*, *30*(4), 445–457.

Krejcie, R. V, & Morgan, D. W. (1970). Determining sample size for research activities. *Educational and Psychological Measurement*, *30*(3), 607–610.

Krouska, A., Kabassi, K., Troussas, C., & Sgouropoulou, C. (2022). Personalizing Environmental Awareness through Smartphones Using AHP and PROMETHEE II. *Future Internet*, *14*(2), 66.

Li, S., Rasiah, R., Zheng, S., & Yuan, Z. (2023). Influence of Environmental Knowledge and Green Trust on Green Purchase Behaviour. *Environment-Behaviour Proceedings Journal*, *8*(26), 353–358.

Milfont, T. L., & Duckitt, J. (2010). The environmental attitudes inventory: A valid and reliable measure to assess the structure of environmental attitudes. *Journal of Environmental Psychology*, *30*(1), 80–94.

Moisander, J. (2007). Motivational complexity of green consumerism. *International Journal of Consumer Studies*, *31*(4), 404–409.

Möser, G., & Bamberg, S. (2008). The effectiveness of soft transport policy measures: A critical assessment and meta-analysis of empirical evidence. *Journal of Environmental Psychology*, *28*(1), 10–26.

Perry, M. S. (2018). 21 st Century Skills through Film Production in Tertiary Education: A Transformative Assessment in a Literature and Media Course. *3L: Southeast Asian Journal of English Language Studies*, *24*(4).

Rasiah, R., Song, L., Kanjanapathy, M., & Chong, K. M. (2023). Towards a Greener Future: Exploring Factors Influencing Green Purchase Intention and Pro-Environmental Behavior among Young Consumers. *Environment-Behaviour Proceedings Journal*, *8*(26), 367–374.

Rhodes, R. E., & de Bruijn, G. (2013). How big is the physical activity intention–behaviour gap? A meta-analysis using the action control framework. *British Journal of Health Psychology*, *18*(2), 296–309.

Sinakou, E., Boeve-de Pauw, J., Goossens, M., & Van Petegem, P. (2018). Academics in the field of Education for Sustainable Development: Their conceptions of sustainable development. *Journal of Cleaner Production*, *184*, 321–332.

Thor, D., & Karlsudd, P. (2020). Teaching and fostering an active environmental awareness design, validation and planning for action-oriented environmental education. *Sustainability*, *12*(8), 3209.

Tu, C.-H., Sujo-Montes, L., Yen, C.-J., Chan, J.-Y., & Blocher, M. (2012). The integration of personal learning environments & open network learning environments. *TechTrends*, *56*, 13–19.

Wang, J., Li, Y., Wang, S., Li, Q., Li, L., & Liu, X. (2023). Assessment of Multiple Ecosystem Services and Ecological Security Pattern in Shanxi Province, China. *International Journal of Environmental Research and Public Health*, *20*(6), 4819.

Zgheib, G. E., & Dabbagh, N. (2020). Social media learning activities (SMLA): Implications for design. *Online Learning*, *24*(1), 50–66.

Zhang, W., Wang, Y., Yang, L., & Wang, C. (2020). Suspending classes without stopping learning: China's education emergency management policy in the COVID-19 outbreak. In *Journal of Risk and financial management* (Vol. 13, Issue 3, p. 55). MDPI.