



Investigation of the Views of Sports Sciences Faculty Students on Knowledge, Attitudes and Practices on Digital Waste Management

Pervin Toptaş Demirci¹, Ali Md Nadzalan² and Erick Burhaein³

¹Mersin University, Faculty of Sports Science, Mersin, Turkey

²Universiti Pendidikan Sultan Idris, Malaysia

³Universitas Maarif Nahdlatul Ulama Kebumen, Faculty of Teacher Training Education, Departement of Sports Education, Kebumen / Indonesia

Article Info

Received: 11.14.2024

Accepted: 20.12.2024

Published: 30.12.2024

Keywords

Sport Science

D-Waste

Knowledge

Attitudes

ABSTRACT

The aim of this research is to investigate the opinions of sports science faculty students regarding their knowledge, attitudes and practices regarding Digital Waste (d-waste) management. In this study, the scanning model, which is one of the descriptive research models, was used. The study group consisted of 530 students, 218 female and 312 male, studying at the Faculty of Sports Sciences of a state university in the fall semester of 2024-2025. A scale was used to indicate the participants' opinions on Knowledge, Attitude and Practice (KAP) regarding D-waste management. The obtained data were analyzed using frequency and percentage values of variables measured at the classical level. Results: It was determined that 81.5%, 89.8%, 83.9%, 81.1% and 90.5% of the participants, respectively, generated e-waste from digital products such as Laptops, Mobile Phones, Televisions, Digital Cameras and Headphones. When their opinions on the disposal of old electronic equipment were asked, it was determined that 64.5% of the participants believed that this equipment should be collected and recycled by the manufacturer. Regarding e-waste practices, 38.9% of the participants stated that the purchase of digital devices was largely influenced by need and convenience, while 34.7% stated that this was due to new and improved features. As a result; it can be argued that knowledge, attitudes and practices towards d-waste positively affect sustainable d-waste management practices, and the desire to collect and recycle d-waste stems mainly from the understanding that such actions reduce the impact of environmental problems and protect human life.



1. INTRODUCTION

The past two decades have shown that Digital waste (D-waste) has been increasing exponentially. E-waste, which includes small and large household appliances, information technology and telecommunications equipment; lighting equipment; electrical and electronic appliances, toys and recreational and sports equipment; medical devices; monitoring and control devices; and automatic dispensers. Rapid changes in technology, falling prices, and planned obsolescence have led to a rapidly increasing surplus of electronic waste worldwide [1,2].

In education, there are studies on technology in different fields such as geography [3], language teaching [4-6], science [7], mathematics [8], and it

is seen that the subject of technology has created a research area in the field of sports sciences. Although technology is also used a lot in the field of sports sciences, examples of these technologies can be given as pedometers, digital videos, blog literacy, game consoles, heart rate monitors, GPS devices, smart boards and multimedia technologies. When looking at the studies conducted on sports science faculty students and digital technology, it is seen that topics such as attitudes towards the use of technology in education [9,10], digital literacy [11], and digital games [12], are addressed, but no direct study has been found that reveals the ways students perceive the concept of d-waste through metaphor. Considering the breadth of technologies used in the field of sports sciences, it is thought that

*Corresponding author

*e-mail: pervindemirci@mersin.edu.tr
 ORCID ID: 0000-0002-3745-8440

Review Article/ DOI: [10.5281/zenodo.14870743](https://doi.org/10.5281/zenodo.14870743)

How to cite this article

Toptaş Demirci, P., Nadzalan, A.M., and Burhaein, B. (2024). Investigation of the Views of Sports Sciences Faculty Students on Knowledge, Attitudes and Practices on Digital Waste Management. *Int. J. Digital Waste Engineering*, 2024, 1(1),28-34.

revealing the meaning that sports science faculty students who will work in this field in the future attribute to the concept of d-waste is important in order to discover their knowledge, attitudes and regarding their knowledge, attitudes and applications regarding d-waste management.

2. MATERIALS AND METHODS

2.1. Participants

The study group consisted of 530 students, 218 female and 312 male, studying at the Faculty of Sports Sciences of a state university in the fall semester of 2024-2025. In this study, 41.1% of the participants were female and 58.9% were male.

Ethical standards were followed in this study and the participant gave informed consent in the form of a consent form covering the research details, risks, benefits, confidentiality and participant rights. The study strictly adhered to the ethical principles of the Declaration of Helsinki, and the rights and well-being of the participant were prioritized in the design, procedures and confidentiality measures.

2.2. Research Model

A descriptive analysis model was used for the purposes of this study. A descriptive model is an approach that aims to describe an existing event as it is. The person or object that is the subject of the research should be defined with its current conditions and should not be changed or transformed in any way. Whatever is intended to be researched or known should be obtained.

2.3. Data Collection Tools

Personal Information Form: A survey form was created to obtain information about the target audience's gender, department, grade levels and the digital equipment you use (Personal Computer, Laptop, Digital Products in the school, Mobile Phone, Television, Washing Machine, Air

application forms regarding d-waste. Based on this, the aim of this research is to investigate the opinions of sports science faculty students

Conditioner, Headphone, Digital Camera, Digital Video).

2.3.1. Knowledge, Attitude and Practice (KAP)

Knowledge, Attitude and Practice (KAP) research related to environmental change is valuable in both developing and developed countries. Questionnaires were distributed and participants rated KAP on a 5-point Likert scale from "Strongly Disagree" to "Strongly Agree". Z-scores were calculated for each variable and then categorized into five levels from "Very Low" to "Very High", coded from 1 to 5 [13].

2.4. Statistical Analysis

The data obtained within the scope of the study will be described using frequency and percentage values for variables measured at the classical level. In order to determine the level of knowledge, attitude and application of sports science students, descriptive statistics such as ratio and frequency.

3. RESULTS

When Table 1 is examined, 41,1% of the students are female, 58,9% are male. 24,9% are studying in coaching education, 24,2% in physical education and sports teaching department, 25,8% in sports management, and 25,1% in recreation department. In addition, 20,8% are in their first year, 30,6% in their second year, 25,5% in their third year, and 23,2% in their fourth year.

The digital equipment used by students were 5.3% Personal Computer, 33.2% Laptop, 100.0% Mobile Phone, 87.7% Television, 6.0% Digital Camera, 3.4% Digital Video, 99.1% Headphone, 82.6% Air Conditioner, 50.9% Washing Machine.

Table 1. Frequency and percentage values regarding demographic characteristics of participants and d-waste usage

Variables	Group	Frequency (n)	Percent (%)
Gender	Female	218	41.1
	Male	312	58.9
Department	Coaching Education	132	24,9
	Physical Education and Sports Teaching	128	24,2
	Sports Management	137	25,8
	Recreation	133	25,1
Grade Level	1st Year	110	20,8
	2nd Year	162	30,6
	3rd Year	135	25,5
	4th Year	123	23,2

Digital equipment you use	Personal Computer	28	5,3
	Laptop	176	33,2
	Mobile Phone	530	100,0
	Television	465	87,7
	Digital Camera	32	6,0
	Digital Video	18	3,4
	Headphone	525	99,1
	Air Conditioner	438	82,6
	Washing Machine	270	50,9

When Table 1 is examined, 23.1% said yes and 76.9% said no to the question “Do you recognize the D-waste symbol?”. Only 81.5%, 89.8%, 83.9%, 81.1% and 90.5% of the respondents were aware that the digital products they use, respectively Laptop, Mobile Phone, Television, Digital Camera and Headphone generate e-waste. 80.9% of the participants are sure that d-waste affects their health. Regarding the negative effects of d-waste on health, 44.3% of the participants stated that psychological problems and 24.0% stated that the effects on the nervous system are the negative effects of d-waste.

In the meantime, respondents' awareness of various aspects of d-waste was assessed. In response to the question about the disposal of d-waste, 91.9% of the respondents reported that it should be given to the vendor or manufacturer for

recycling. Participants were also asked if there were any companies collecting d-waste and the majority of the participants, 94.0%, answered yes. Only 4.4% of the participants were aware of government guidelines on d-waste (Table 2).

When participants' attitudes towards various aspects of d-waste were evaluated, when asked who was responsible for the disposal of d-waste, 23.0% of the participants believed that it was their responsibility to dispose of their personal e-waste. 31.7% of the respondents think that Municipal Corporations should play an important role in e-waste disposal. When asked about their views on the disposal of old electronic equipment, 64.5% of respondents believe that this equipment should be collected and recycled by the manufacturer (Table 2).

Table 2. Knowledge and attitude regarding d-waste

Particulars	Responses	Frequency (n)	Percent (%)	Particulars	Responses	Frequency (n)	Percent (%)
Knowledge regarding e-waste							
Correctly recognized d-waste symbol	Yes	122	23,1	Disposal of d-waste	Disposed with normal waste	43	8,1
	No	408	76,9		Should be given to the seller or manufacturer for recycling	487	91,9
Products that produce d-waste							
Laptop	Yes	432	81,5	Are you aware of the effect of discarding the equipment	Yes	175	33,0
	No	98	18,5		No	355	67,0
Mobile Phone	Yes	476	89,8	Are you aware of the chemical present in digital equipments	Yes	74	14,0
	No	54	10,2		No	456	86,0
Television	Yes	445	83,9	Any company that collects discarded d-waste for recycling	Yes	498	94,0
	No	85	16,1		No	32	6,0
Digital Camera	Yes	430	81,1	Aware of d-waste govt guidelines	Yes	23	4,4
	No	100	18,9		No	507	95,6
Headphone	Yes	480	90,5	Attitude regarding e-waste user			
	No	50	9,5	As per your opinion responsibility for d-waste disposal	Manufacturer of products	122	23,0
	Definitely	429	80,9		Municipal Corporation	168	31,7

D-waste adversely affects the health	Don't know	31	5,8	lies with	Seller	22	4,2
	No	23	4,3		Stored in house	218	41,1
	Perhaps	37	7,1		Should be put with normal waste	188	35,5
	To some exten	10	1,9		Should be collected and recycled by manufacturer	342	64,5
Adverse health effect caused by d-waste	Effect on Nervous System	127	24,0	Your opinion for disposal of old digital equipments	Correct knowledge	145	27,4
	Poisoning of heavy metal	143	27,0		Incorrect knowledge	255	48,1
	Psychological problems	235	44,3		Should be stored at home	35	6,6
	Others	25	4,7		Should sell to scrap dealer	95	17,9

Regarding e-waste practices, 38.9% of respondents stated that the purchase of digital devices was largely influenced by need and convenience, while 34.7% stated that it was driven by new and improved capabilities. 63.8% of respondents indicated that the most common option adopted to dispose of digital devices was to sell them to resellers instead of a new product. When asked after how many years have you replaced your digital devices, 63.2%, 88.7%, 31.2%, 31.2%, 64.8% and 64.8% of Personal Computer, Laptop, Mobile Phone and Other

electronic equipments respectively answered 5 years and above (Table 3).

To the question asked about the reasons for changing your digital devices, the majority of the participants stated that it was because they were old. When asked why they needed to dispose of their digital devices, the majority of the participants stated that they did not work and could not be repaired. When asked which options they adopt when disposing of their devices, the majority of participants stated that they sell to sellers instead of a new product (Table 3).

Table 3. Practice regarding d-waste

Particulars	Responses	Frequency (n)	Percent (%)	Particulars	Responses	Frequency (n)	Percent (%)	
Purchase of the gadget influenced by	Advertisement	26	4,9	Condition of the equipment while discarding	Beyond repair	277	52,3	
	New advanced facilities	184	34,7		Stuck	23	4,3	
	Increase in income	94	17,7		Personal Computer	Was working	224	42,3
	Requirement and convenience	206	38,9		Others	6	1,1	
	Status symbol	12	2,3		Beyond repair	225	42,5	
Purchased digital good	Others	8	1,5	Laptop	Stuck	12	2,3	
	New	378	71,3	Was working	283	53,3		
How many years later did you replace the gadget					Others	10	1,9	
Personal Computer	Before 1 year	6	1,1	Mobile Phone	Beyond repair	285	53,8	
	In 1-2 years	24	4,5	Stuck	8	1,5		
	In 2-3 years	45	8,5	Was working	229	43,2		
	In 3-5 years	120	22,7	Others	8	1,5		
	5 years or more	335	63,2	Other digital equipments	Beyond repair	212	40,0	
Laptop	Before 1 year	1	0,2	Stuck	13	2,5		
	In 1-2 years	3	0,5	Was working	277	52,3		
	In 2-3 years	7	1,3	Others	28	5,2		
	In 3-5 years	49	9,3	Options adopted in disposing the gadgets				
	5 years or more	470	88,7	Donated to friends, relatives, schools, charitable institutions	103	19,4		

Mobile Phone	Before 1 year	52	9,8	Personal Computer	Gave it to the scrap dealer	47	8,9
	In 1-2 years	78	14,7		Selling to sellers in lieu of a new product	338	63,8
	In 2-3 years	102	19,2		Stored at home	22	4,2
	In 3-5 years	133	25,1		Throw it into the dustbin with other waste	18	3,3
	5 years or more	165	31,2		Others	2	0,4
Other electronic equipments	Before 1 year	3	0,6	Laptop	Donated to friends, relatives, schools, charitable institutions	175	33,0
	In 1-2 years	11	2,1		Gave it to the scrap dealer	25	4,7
	In 2-3 years	55	10,4		Selling to sellers in lieu of a new product	285	53,8
	In 3-5 years	117	22,1		Stored at home	30	5,7
	5 years or more	344	64,8		Throw it into the dustbin with other waste	10	1,9
Reasons for replacement					Others	5	0,9
Personal Computer	Got older	217	40,9	Mobile Phone	Donated to friends, relatives, schools, charitable institutions	8	1,5
	New facilities	113	21,3		Gave it to the scrap dealer	12	2,3
	Repair was not possible	188	35,5		Selling to sellers in lieu of a new product	478	90,2
	Other reasons	12	2,3		Stored at home	10	1,8
Laptop	Got older	257	48,5	Laptop	Throw it into the dustbin with other waste	18	3,4
	New facilities	76	14,3		Others	4	0,8
	Repair was not possible	174	32,8				
	Other reasons	23	4,4				
Mobile Phone	Got older	389	73,4				
	New facilities	33	6,2				
	Repair was not possible	87	16,4				
	Other reasons	21	4,0				

4. DISCUSSION

In sports science education, the effective use of digital technologies is very important, especially in online education and in the structuring of the education system [14]. Because with the development of technology, digital environments have become an indispensable part of our lives.

With the digitalizing world, the use of digital technologies in all areas such as business sectors, education, shopping, socialization and health has become indispensable as it makes life easier [15]. When the literature is examined; it is emphasized

that spending time in digital environments has become an indispensable requirement for individuals with the widespread use of portable

devices (computers, mobile phones, tablets) in accessing the internet [16, 17].

According to our study results; It was determined that the participants used Laptops, Mobile Phones, Televisions, Digital Cameras and Headphones and were aware that these digital products produced e-waste. It was determined that d-waste affected the health of the participants and mostly these effects showed psychological problems and effects on the nervous system. However, it was reported that d-waste should be given to the seller or manufacturer for recycling regarding its disposal. The number of participants who were aware of the government guidelines on d-waste was quite limited. The participants believed that the participants were responsible for the disposal of d-waste. The participants believed that d-waste should be collected and recycled by the municipal companies by the manufacturer.

Globally, d-waste knowledge, attitude, implementation intention and risk perception are among the areas that have been extensively researched due to their impact on the sustainable management of d-waste. They emphasize that d-waste awareness is one of the important ways to achieve realistic long-term sustainable d-waste management [18, 19]. However, Attitude is an undesirable or optimistic evaluation of a person regarding a certain behavior. However, knowledge is a situational and conditional characteristic that controls environmentally friendly attitudes and behaviors. According to some studies, it has been stated that understanding the deficiencies in d-waste is important at all institutional levels [20].

According to our results; It was stated that purchasing digital devices regarding d-waste practices is largely influenced by need and convenience, while it was found that the most common option to dispose of digital devices is to sell them to resellers instead of buying a new product. It was stated that personal computers, laptops, mobile phones and other electronic equipment were wanted to be replaced because they were considered to be 5 years or older and digital devices were not working and could not be repaired.

In a study conducted by Meem RA et al. [21], it was determined that 100% of the population is involved in e-waste generation but only 73.5% are aware of its management. On the other hand, about 96.8% of the residents think that the city does not manage d-waste well. About 95.2% of the respondents said that they would be interested in helping to develop a responsible and safe recycling program in the city to eliminate the negative consequences of d-waste. According to a study conducted by Arpitha V. S. et al.[1] among medical

students, 81.18% and 95.82% of the respondents were aware of the risks posed by d-waste to human health and the environment. It was observed that 56.44% of the respondents routinely replaced their electronic equipment to keep up with technology and 97.91% had a desire to learn more about d-waste. More than half of the respondents in the study believed that d-waste disposal was due to lack of awareness.

Therefore, knowing the impact of d-waste on human health and the environment, collection areas, recycling and disposal areas contribute to sustainable d-waste management practices. Indeed, knowing the hazardous impact of d-waste on public health and the environment when handled improperly, employees can promote and scale up awareness campaigns for d-waste collection, recycling and disposal.

5. Conclusion

As a result; It can be concluded that knowledge, attitudes and practices towards d-waste positively affect sustainable d-waste management practices and moreover, taking old electrical and electronic equipment to recycling and disposal centers is appropriate for human health and environmental protection. Attitude plays a vital role in affecting the decisions of electronics companies, electronics sellers and electronics stores to implement old device take-back systems, therefore, it can be said that d-waste attitude is one of the main elements affecting the behaviors of sports science students. In addition, it can be argued that the courage and willingness to collect and recycle d-waste and the attitude and practice of sports science students are mainly due to the understanding that such actions reduce the impact of environmental problems and protect human life.

Conflict of Interest

No conflict of interest is declared by the authors. In addition, no financial support was received.

Ethics Statement

Ethical standards were followed in this study and the participant gave informed consent in the form of a consent form covering the research details, risks, benefits, confidentiality and participant rights.

Author Contributions

Study Design, PTD, AMN and EB; Data Collection, PTD; Data Interpretation, PTD, and EB; Manuscript Preparation, PTD; Literature Search, PTD and AMN. Author has read and agreed to the published version of the manuscript.

REFERENCES

1. Jain, M., Kumara, D., Chaudhary, J., Kumar, S., Sharma, S., Vermae, A.S (2023). Review on E-waste management and its impact on the environment and society. *Waste Management Bulletin*, 1:34–44. [CrossRef]
2. Grandhi, S.P., Dagwar, P.P., & Dutta, D. (2024). Policy pathways to sustainable E-waste management: A global review. *Journal of Hazardous Materials Advances*, 16, 100473. [CrossRef]
3. Bengel, P.T., & Carina, P. (2021). Modern technology in geography education-attitudes of pre-service teachers of geography on modern technology. *Education Sciences*, 11(11). [CrossRef]
4. Birinci, F.G. (2020). A Review on Information Technologies Used in Teaching Turkish as a Foreign Language. *Sakarya University Journal of Education*, 10(2), 350-371. [CrossRef]
5. Çevik, K.K., Önal, N., & Şenol, V. (2018). Design of a mobile application for teaching English in the context of tenses: Sauce Table. *AJIT-e: Journal of Information Technologies Online*, 9(32), 73-86. [CrossRef]
6. Isaeva, T., Malishevskaya, N., Goryunova, E., Lazareva, L., & Churikov, M. (2021). Psychological and pedagogical aspects of simulation technology at english lessons for future engineers of the agroindustrial complex. *Les Ulis: EDP Sciences*. [CrossRef]
7. Benli, E., Kayabaşı, Y., & Sarıkaya, M. (2012). The effect of technology-supported teaching in the science and technology course 'Light' unit of primary school 7th grade students on their science achievement, retention and attitudes towards science. *Gazi Faculty of Education Journal*, 32(3), 733 - 760.
8. Köysüren, M., & Üzel, D. (2018). The effect of using technology in mathematics teaching to mathematical literacy of grade 6 students. *Necatibey Faculty of Education Journal of Electronic Science and Mathematics Education*, 12(2), 81 - 101. [CrossRef]
9. Wiemeyer, J. (2018). Students' Use of and Attitudes Towards Information and Communication Technologies in Sport Education Cross-Sectional Surveys Over the Past 15 Years. In: Lames M., Saupe D., Wiemeyer J. (eds) Proceedings of the 11th International Symposium on Computer Science in Sport (IACSS 2017). IACSS 2017. *Advances in Intelligent Systems and Computing*, vol 663. Springer, Cham. [CrossRef]
10. Yıldırım, E., Uğurlu, M. F., & Gözübüyük, K. (2018). Attitudes and thoughts of students studying at the faculty of sports sciences regarding the use of technology in education. *Electronic Turkish Studies*, 13(21). [CrossRef]
11. Güngör, N.B., & Kurtipek, S. (2020). Examining the effect of individual innovativeness level of sport sciences faculty students on digital literacy with structural equation modeling. *Journal of Human Sciences*, 17(2), 756-767. [CrossRef]
12. Bozkurt, T. M., Dursun, M., & Arı, Ç. (2019). Investigation of the attitudes of sports science faculty students towards playing digital games. *Journal of Human Sciences*, 16(4), 1217-1227. [CrossRef]
13. Dishman, H., Stallknecht, D., & Cole, D. (2010). Duck hunters' perceptions of risk for avian influenza, Georgia, USA. *Emerging infectious diseases*, 16(8): 1279. [PubMed]
14. Yücel, A. & Devocioğlu, S., (2012). Use of Information and Communication Technologies in Sports Education. *e- Journal of New World Sciences Academy NWSA-Sports Sciences*, 7(2), 1-17.
15. Baba Kaya. H., & Soyer. F. (2020). The effects of individual exercise program and neurofeedback applications on gaming addiction, personality traits, psychological symptoms and brain waves. Istanbul: LAP Lambert Academic Publishing.
16. Cassidy, E.D., Colmenares, A., Jones, G., Manolovitz, T., Shen, L., & Vieira, S. (2014). Higher education and emerging technologies: Shifting trends in student usage. *Journal of Academic Librarianship*, 40,124-133. [CrossRef]
17. Fitton, V. A., Ahmedani, B. K., Harold, R. D., & Shifflet, E. D. (2013). The role of technology on young adolescent development: Implications for policy, research and practise. *Child and Adolescent Social Work Journal*, 30, 399-413. [CrossRef]
18. Almulhim, A.I. (2022). Household's awareness and participation in sustainable electronic waste management practices in Saudi Arabia. *Ain Shams Engineering Journal*, 13(4), 101-117. [CrossRef]
19. Tian, T., Liu, G., Yasemi, H., & Liu, Y. (2022). Managing e-waste from a closed-loop lifecycle perspective: China's challenges and fund policy redesign. *Environmental Science and Pollution Research*, 29(1), 1-12. [PubMed]
20. Dhir, A., Malodia, S., Awan, U., Sakashita, M., & Kaur, P. (2021). Extended valence theory perspective on consumers'e-waste recycling intentions in Japan. *Journal of Cleaner Production*, 312(8), 127-143. [CrossRef]
21. Meem, R.A., Majumder, A.K., & Bahauddin, K.M. (2021). Assessment of knowledge, attitude and practice (kap) of electronic waste management among consumers in Dhaka City, Bangladesh. *GSC Advanced Research and Reviews*, 8(2):126 35. [CrossRef]
22. Arpitha VS, Patil PS. (2020). Knowledge, attitude, and practice of e-waste among medical students, Dharwad. *Int J Med Sci Public Health*, 9(8):488-491. [CrossRef]

