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Digital Detox: The Urgency of E-Waste Awareness

In the current age of rapid technological development, the widespread production and usage of electronic devices has significantly impacted our daily lives, offering unparalleled convenience and efficiency. However, with the advent and proliferation of modern technology comes the eventual disposal of these devices. Every year millions of electronic devices are broken or become obsolete and are improperly disposed of, resulting in what is known as electronic waste, or e-waste for short.

E-waste has been an issue for as long as consumer electronics have been around, becoming increasingly prominent due to the growing volume of discarded electronic devices worldwide. As per the Global E-waste Monitor 2020, an astonishing 53.6 million metric tons of e-waste was generated globally in 2019, demonstrating a rapid increase from previous years. This volume is expected to reach 74.7 million metric tons by 2030, highlighting the urgent need for comprehensive waste management solutions.[1]

In fact, e-waste is the quickest growing solid waste stream in the world, increasing at a rate three times faster than the human population. Despite its rapid increase, less than a quarter of all e-waste generated in 2019 was properly recycled. This lack of recycling not only results in the loss of valuable and finite resources but also poses significant health risks, particularly in low and middle-income countries (LMICs) where appropriate recycling infrastructure and regulations may be lacking. Oftentimes, e-waste is illegally shipped out of developed countries to less developed countries, exacerbating the problem and leading to inferior recycling processes that can release harmful chemicals into the environment.[2]

E-waste is a growing concern due to the numerous environmental and health issues it causes when disposed of improperly. The World Health Organization highlights the severe health impacts of e-waste, particularly on children and expectant mothers. Exposure to toxic substances like lead and mercury, commonly found in discarded electronics, can significantly harm children's health, affecting their development and increasing the risk of diseases. Specifically, toxins from e-waste have been associated with complications with birth, adverse neurological outcomes (including ADHD), and sensory problems.[3] As a result, e-waste is one of the most important problems our generation faces with the advent of modern technology.

The history of e-waste dates back not much longer than a century and a half, starting with the invention of the lightbulb and telephone in the 1870’s. Since then, many electronic inventions were gradually made but it wasn’t till the 1980’s that electronic devices became so commonplace that their waste started becoming a concern. In 1992, the Basel convention ratified by 20 countries sought to address concerns about hazardous e-waste getting exported for dumping in developing countries. Since then, although e-waste management knowledge and awareness have grown, they have not managed to catch up to the volumes of e-waste being generated.[4]

Currently, it is known that although the economic value of e-waste materials is $57 billion, only about $10 million of that is actually recycled. Some of the major challenges in tackling this problem are collection, sorting/separation of waste, cost-effective recycling and future waste prevention. In addition, there are only 78 countries in the world with legislation concerning e-waste, leaving much of the problem unregulated.[5] In addition, one of the major research gaps in this field relates to its impacts in the Asia-Pacific region which is one of the most rapidly developing, recently industrialized and densely populated regions of the world.[6] This issue is at the heart of current environmental science concerns, some of the concepts needed to understand this topic are waste management, as well as hazardous waste handling, recycling, reusing, circular economy and demanufacturing. Demanufacturing is the dismantling of electronic equipment into its components. Recently, researchers at NC state have been working on AI-powered waste sorting technologies that can help more effectively sort waste and optimize its recycling. Using digital cameras, hyperspectral cameras and smart sensors they can use machine learning to improve the identification and separation of waste. This development could really help optimize the efficiency of e-waste recycling.[7]

E-waste is far more than merely an expanding heap of discarded gadgets.. It is an urgent issue with strong effects on the environment and human health. It's not just the increasing volume, which is growing at a rate of 3-5% annually,[8] that makes this topic important. It's also about what's inside these gadgets: a mix of valuable resources and dangerous chemicals. There are four main reasons why e-waste is a priority waste stream, namely: global quantities of e-waste, resource impacts, potential health and environmental impacts and ethical concerns.[9]

The importance of e-waste cannot be ignored. As mentioned previously, for humans, improperly managed e-waste can pose serious health risks. There is a strong possibility that toxic substances like lead and mercury can seep into the environment, contaminate soil, and water and then find their way into our bodies. This can cause a variety of health issues from kidney damage to neurological disorders.[3] However, it's not just us who can suffer these consequences. Wildlife and ecosystems are also strongly affected by e-waste pollution. These chemicals can disrupt habitats and food chains.

Is anyone observing this? An increasing number of stakeholders are uniting to combat this issue. This includes large tech companies like Microsoft and Apple[10], environmental advocates and policy makers. They are motivated by the idea that e-waste is not only a waste management problem but also an injustice to the environment. This emphasizes the need for sustainable consumption and waste management awareness.

However, public awareness about this issue is still lagging. A study conducted by the University of Hyderabad found that only 71% of all informal garbage handlers did not know the health risks associated with handling e-waste disposal.[11] Many people don’t know either the seriousness of this issue or what to do with their old gadgets. This gap in awareness leads to the situation where valuable materials are lost in landfills and toxic chemicals continue to pollute the

planet. Therefore, involvement and education about this topic is very important. It can truly make a difference if we are able to inform people about the impact of e-waste on our ecosystems and how to correctly dispose of old electronics.

Our target audience would be for the general public as well as companies in the environmental business. These include politicians, activists, business-development leaders, recruiters, and campaigners to specialize in the advertising sector to maximize the amount of exposure. This is especially ascertained if it reaches the international level, because there are so many connections, such as EPA, which works with governments all around the world on the IEMN[12] By increasing the publicity from more day-to-day activities such as on the radio and news outlets, we increase the public awareness of the subject. As time passes, everyone becomes very used to the idea of e-waste recycling. By becoming ingrained in our minds, we are then more inclined to participate in various activities and events such as international E-Waste Day, which would then raise money to further boost the public profile. This positive cycle guarantees job growth, investment, and encourages consumers to do their part in this responsibility. They are, after all, the largest group of our target audience. Individual households make up a very large portion. Similar to a news article subscription service, every donation and contribution counts, because when added together, it becomes an extremely important statistic in the success of any program. Those families are also the most at risk, with young children especially.[13] Therefore, it is imperative that they are the first to be inspired and on board with our program. This creates fidelity and is passed on to other people who will think even more positively.

We decided on creating an interactive website as the format for public outreach. The website will include all the topics surrounding e-waste mobility, problems to address, improvements to be made, and current status. It will contain details in an easy to read and understandable and informative manner and have links to credit outside sources and contributors. A website is very simple to access, as over 60% of the world's population have access to the internet, with approximately 90% of people in developed countries like North America (91%) and Europe and Central Asia (83.8%).[14] Moreover, it is highly interactive and dynamic, as we can input lots of information and update when necessary.

Amanda Collins, an employee in the eLearning industry, explains how interaction within learning is extremely important not just to foster motivation, but stronger retention, comprehension, and can create human connection.[15] She covered another article, written by University of California-San Francisco professor Bruce Alberts, which incorporated more detail and metric calculations on the topic.[16] This basis of learning is exactly what we hope to accomplish when educating the world about E-Waste. As stated previously, simple implementations like a map of where the nearest E-Waste landfill is, or matching what waste goes to what trash bin, are going to be crucial to learning and creating the first steps of our recycling goals. As we aim to be informative, we will include a number of tabs of articles and research that are designed to educate the minds of those interested and provide detailed information to make it easier on the reader to fully picture. Long term, if we were to expand our

website, an interactive map that allows us to zone in on the user's location and find E-Waste landfills or other sites to help recycle would be incredibly useful and make this full scale, however we will start by focusing on our surrounding area and expand as necessary. Education on E-Waste is going to be our main goal, and making sure people understand the topic, its importance, and how they can help will set up a great base to recover from this issue.

The launching of our website can be done in a number of ways. The designers can launch without an announcement and hope traffic comes their way. This usually is ineffective if there is no publicity to drive the traffic, which leads to our execution. What we will be able to do is use another common form of social media, whether it be Instagram, X, Threads, Facebook, anything that we can entice users to learn more about E-Waste and include links to our website. This creates ease when checking if we have a successful launch. You can track clicks on hyperlinks, and also obtain data on users that find the websites through simple google searches. This way, we can develop what sources to put more of an effort into and find what outreach programs work better than others. For example, if an Instagram post with a hyperlink gains more traffic than a Facebook post, we might focus on posting more to fill our interested party's feeds. If necessary, we can also post information about an upcoming website before the launch with a countdown so that people can gain interest early, this creates a sense of importance and tension, and could benefit the flow to our site.

The importance of this topic shows a multitude of human and non-human effects. Annual growth results from 2020 estimate three to five percent, thrice higher than any other municipal solid waste. As technology continues to become more advanced and more a part of our lives, we find ourselves becoming increasingly dependent on it to survive. This also means that there will be more and more waste as a result, from outdated software and hardware to upgrades that render an entire fleet of processors obsolete. For example, in 2019, global waste totaled to around 2 billion tonnes, with e-waste accounting for 53.6 million tonnes, up 21% from 2015.[17] This has effects on both our health and wellbeing, such as contaminated water and food, but also on society, of companies getting sued and even displacing communities.[18] Having an environmentally sustainable and efficient way of dealing with e-waste that can spur development and accommodate our rapidly changing society. Additionally, lots of people, including some directly in the market, lack the ultimate awareness including 70% of sellers and 55% of maintenance workers.[19] Many people are in tune with this topic, with some kickstarting events that have gained a massive following and recognition worldwide, such as International E-Waste Day, happening on October 14th every year.[20] However, there is always room to improve.

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