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Implementation Of State Of New Mexico's Manual Of Procedures Psab Supplement 12 Capital Assets By A Southern New Mexico School District In Disposal Of E-Waste In The Post Covid 19 Environment

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IMPLEMENTATION OF STATE OF NEW MEXICO'S MANUAL OF PROCEDURES PSAB SUPPLEMENT 12 CAPITAL ASSETS BY A SOUTHERN NEW MEXICO SCHOOL DISTRICT IN DISPOSAL OF E-WASTE IN THE POST COVID 19 ENVIRONMENT

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Chapter I: Introduction

The COVID-19 pandemic has caused diverse challenges in social, economic, and political spheres. The particular challenge that was the focus of this study is the surge in the use of electronic products and the consequent upsurge in electronic waste (e-waste) precipitated by the closure of schools that led to the implementation of online instructional delivery processes (Ermakova, 2021). As indicated by Adejumo and Oluduro (2021), digitization and an increase in time spent at home resulted in an increase in consumption of electronic and electrical equipment during the COVID-19 pandemic as businesses switched to home offices, providing their staff with laptops and other office equipment for home use. Moreover, schools and universities have been forced to resort to homeschooling and online synchronous/asynchronous instructional methods meaning that schools and students now use more instructional technology equipment than before.

Further, Baldé and Kuehr (2021) noted that to mitigate the negative influences of the pandemic on the educational sector, school districts directed massive financial investments to purchasing Chromebooks, iPads, teacher laptops, modems, projectors, interactive boards, and other electronic equipment needed to provide online instruction. Also, the Biden rescue plan allocated funds to purchasing technology for teaching and learning. Whereas these measures were necessary, Jiang et al. (2021) anticipated that the trend would soon lead to heightened e-waste generation. One of the measures that school districts use currently to ensure ethical disposal of e-waste is working with institutions that purchase e-waste. Despite the efforts made by such organizations to facilitate e-waste disposal, determine whether the manuals of procedures used by the purchasers foster ethical and responsible disposal within the context of the post-COVID-19 environment is unclear.

COVID-19 has led to a heightened use of electronic equipment, especially laptops by both students and teachers. Notably, the increase in the consumption of electronics in the field of education has significantly increased the amount e-waste generated. Sacco et al. (2021) analyzed the effect of the COVID-19 pandemic on e-waste by comparing the trade statistics against business-as-usual scenarios before and during the pandemic and discovered that during the first quarter of 2020, the use of laptops and Ipad increased by approximately 5.4% in high-income countries. Although researchers have focused on e-waste generation and increases due to the general increase in the purchase of electronics such as iPads and game consoles during the pandemic, the procedures used by educational institutions to ensure ethical disposal of electronics used by teachers and students after the electronics reach their end of life have attracted minimal attention (Kurniawan et al., 2022). As indicated by Singh (2022), in the post-COVID dispensation, researchers should pay more attention to investigating the disposal measures used by education institutions given the notable rise in the consumption of electronic products by teachers and students to facilitate online learning.

Before the pandemic, a study by Sovacool (2019) revealed that the cumulated e-waste around the world was a record 53.7 million metric tons. Considering that the pandemic increased the use of electronic devices, Ermakova (2021) estimated that the increases in electronic device consumption within the educational sector are likely to escalate e-waste generation to approximately 75 million metric tons by 2030. The responsible recycling of school-generated e-waste increased when the COVID-19 pandemic led to the shutdown of schools in March 2020, leading to a decision by local, state, and national governments to make massive investments in schools using local, state, and national monies (Ribeiro et al., 2022). A significant amount of these funds went into purchasing Chromebooks, iPads, teacher laptops, modems, projectors,

interactive boards, and other electronic equipment needed to provide online instruction (Ribeiro et al., 2022).

Recent concerns about the contribution of the pandemic to e-waste generation relate to the associated disposal procedures with a particular focus on the life span of the electronic technology products used to provide online instruction. Such products include Chromebooks, iPads, teacher laptops, modems, projectors, and interactive boards. Researchers, however, have seldom focused on the disposal process school districts use to guarantee ethical disposal of e-waste generated by the educational system (Sacco et al., 2021). Particularly, this is a chief problem given that the electronic gadgets being used to facilitate online learning are associated with specific end-of-life parameters making it critical to come up with measures for the disposal of this surplus technology ethically and responsibly. Researchers who have explored this aspect have focused on organizations that purchase e-waste from schools as being responsible for the recycling of surplus technology (Dayaday & Galleto Jr, 2022). Baldé and Kuehr (2021), however, noted that without insights into the usefulness of the procedures outlined under school district policy it may not be possible to determine the effectiveness of educational institutions' reliance on external organizations for the disposal and recycling of e-waste. Notably, existing literature lacks sufficient information to help determine if organizations that purchase surplus technology from schools are responsible and ethical recyclers, which was the gap addressed in the current study.

Problem Statement

It was not known whether the State of New Mexico's Manual of Procedures for Public School Accounting and Budgeting Supplement 12 Capital Assets and its implementation by the Southern New Mexico School District leads to the ethical and responsible disposal of e-waste in

the post-COVID-19 pandemic environment. Whereas the Public School Accounting and Budgeting requirements allow organizations to purchase used electronic gadgets from schools, the effectiveness of the disposal and recycling measures used by such institutions may not help address the challenge of the upsurge in e-waste generation in the post-COVID-19 context. According to Adejumo and Oluduro (2021), before the pandemic, individuals and institutions that purchase laptops and computers from education institutions expressed that they could not carry out their responsibility effectively because many of the computers disposed had become non-functional and could not be refurbished.

From such a perspective, the need for schools to collaborate with organizations that purchase used electronic equipment to assist with disposal and recycling becomes clear. Such a collaboration, however, may not yield the anticipated results given that the pandemic led to unprecedented increases in electronic gadget consumption in the educational sector (Kurniawan et al., 2022). Notably, before the pandemic, schools generated approximately 4 million tons of e-waste (Kurniawan et al., 2022). These statistics imply that the organizations purchasing used electronics from schools to aid with disposal and recycling may not be able to match the increasing disposal rate. As indicated by Trivedi et al. (2022), this lack of capacity makes e-waste a growing environmental threat because most e-waste contains toxic and dangerous chemicals and substances, including lead and mercury.

The U.S. Environmental Protection Agency (EPA) has been attempting to address the waste menace, even before the pandemic. According to Singh et al. (2018), the EPA works bilaterally with governments and environmental officials around the world on e-waste management. Further, EPA supports the U.S. Government's National Strategy for Electronics Stewardship, which formulates the federal government's plan to enhance the management of

electronics throughout the product lifecycle (Duman et al., 2019). Despite its notable efforts over the years, the national recycling strategy is unlikely to be useful in the post-COVID-dispensation given that its policies were not designed to cater to an upsurge in the disposal of used electronic devices as has been witnessed during and after the pandemic. Further, Ribeiro et al. (2022) estimated that e-waste before the pandemic constituted around 2% per U.S. State but rose to approximately 4.3% between 2019 and 2022. As such, the existing EPA strategies for recycling are likely to become ineffective or partially effective owing to the unanticipated surge in the use of electronic devices in institutions and households.

The New Mexico Solid Waste Act embraces a hierarchical approach to waste management (Powell & Chertow, 2019). Under this Act, the priority strategy is to source reduction and recycling are prioritized followed by environmentally safe transformation (energy recovery or waste to energy) and environmentally safe landfill disposal (Powell & Chertow, 2019). This scheme parallels the EPA Integrated Waste Management Hierarchy. The hierarchy reflects costs associated with the various approaches to managing waste. According to Trivedi et al. (2022), reducing waste at the source is the most cost-effective approach in the states, whereas landfilling is considered the most expensive overall. Nonetheless, in New Mexico, transformation does not appear to be environmentally friendly because of reliance on landfilling as the more feasible approach. Although the current Public School Accounting and Budgeting requirements are designed to ensure that disposal is done in an environmentally safe manner, whether the organizations and individuals involved in implementing the disposal and recycling procedures adhere to the required ethics is not guaranteed (Shittu et al., 2021).

Purpose of the Study

The purpose of this study was to determine whether the implementation of the State of New Mexico's Manual of Procedures Public School Accounting and Budgeting Supplement 12 Capital Assets by the Southern New Mexico School District leads to ethical and responsible disposal of e-waste in the post-COVID19 pandemic environment. The COVID-19 pandemic led to the closure of schools and the beginning of the implementation of online instructional delivery processes in March 2020 (Sacco et al., 2021). To provide online instruction, school districts made massive financial investments in Chromebooks, iPads, teacher laptops, modems, projectors, interactive boards, and other electronic equipment (Sacco et al., 2021). Districts should be concerned about what happens when all of these electronics reach the end of life after 5–6 years of use and are declared obsolete. School districts will continue to provide all of these electronic resources to the approximately 318,000 students in New Mexico on a recurring 5–6 year cycle. Based on this period, electronics that the school districts purchased beginning in March of 2020 to support the implementation of online instruction due to the pandemic will reach the end of life between 2025 and 2026 (Singh, 2022). The recurring purchase of thousands of laptops and peripherals every 5–6 years to replace those that have reached the end of life will present a significant challenge for the school districts in New Mexico.

Research Questions

The following research questions guided this study:

RQ1: How do the current Southern New Mexico School District and New Mexico State Surplus Disposal Policies promote the responsible disposal of Chromebooks, iPads, teacher laptops, modems, projects, interactive boards, and other electronic equipment that were purchased for student and teacher use during the pandemic?

RQ2: How does the implementation of the State of New Mexico's Manual of Procedures Public School Accounting and Budgeting Supplement 12 Capital Assets by the Southern New Mexico School District lead to the ethical and responsible disposal of e-waste in the post-COVID19 pandemic environment?

Definitions

A list of key terms used throughout this research is as follows.

COVID-19: Covid-19 is a disease caused by a virus named SARS-CoV-2 that was discovered in December 2019 in Wuhan, China (Jiang et al., 2021).

E-waste: E-waste refers to discarded electronic gadgets such as Chromebooks, laptops, desktop computers, modems, projectors, and interactive boards that are no longer useful and/or have reached their end of life (Singh, 2022).

Environmental/Ecological Pollution: Environmental pollution refers to the contaminating or rendering unclean or impure the air, land, or waters of the state, or making it injurious to public health, harmful for commercial or recreational use, or deleterious to fish, birds, animal or plant life (Adejumo & Oluduro, 2021).

E-waste Management: E-waste management is a process used to collect e-waste, recover and recycle material by safe methods, and dispose e-waste by suitable techniques to reduce its adverse impacts on the environment (Adejumo & Oluduro, 2021).

E-waste Recycling: E-waste recycling is the reuse and reprocessing of electrical and electronic equipment of any type that has been discarded or regarded as obsolete (Singh, 2022).

Assumptions

The epistemological assumption in the current study is based on the notion of constructionism. According to Cruz and Tantia (2017), constructionism is the view that the

knowledge generated through research investigations is constructed rather than discovered. This assumption applied to the current study because the researcher had to draw information from records provided by the Southern New Mexico School District about the people or organizations that purchase the electronics at auction. Thus, the information drawn from the records increased the understanding of the use of the State of New Mexico's Manual of Procedures Public School Accounting and Budgeting Supplement 12 Capital Assets regarding the disposal of e-waste in the post COVID-19 pandemic environment.

Scope and Delimitations

The focus of this study was on the problem of lack of ample research on the utilization of state disposal manuals by organizations that purchase used electronics from schools and their implementation of waste disposal procedures to ensure ethical and responsible e-waste disposal and recycling. This specific focus was chosen because limited research exists in relation to the approaches used by school districts in the post-COVID-19 era to dispose e-waste given that the pandemic led to unprecedented increases in the utilization of electronic gadgets to faciliate online learning and such electronic gadgets, including iPads, laptops, modems, and Chromebooks, are expected to reach their end of life after 5–6 years of use (Singh, 2022). The study was delimited to the State of New Mexico and the accompanying disposal procedures used by the Southern New Mexico School District.

Limitations

For the current study, meeting the standard of trustworthiness associated with the credibility criteria was a limitation. Chiefly, this limitation stemmed from the possibility of researcher bias and the accompanying researcher interpretations (see Given, 2008) relative to the information acquired from the Southern New Mexico School District about the people or

organizations that purchase the electronics at auction. Therefore, while discussing the acquired data from the three cases, the researcher acknowledged that the research is value-laden and that researcher bias, which may occur during data interpretation (Given, 2008), was a significant possibility in the current study.

The transferability element of trustworthiness in qualitative research connotes the extent to which results generated can be transferred to other settings or populations (Sutton & Austin, 2015). This study has limited transferability due to possible researcher bias. Because investigator judgments influence the ability to generalize findings, the presence of researcher bias impacted how this researcher presented or described the results in light of other settings and contexts (see Marshall & Rossman, 2016). The researcher mitigated the influences of this limitation by providing succinct and ample descriptions of the research processes and findings to facilitate the application of the study's findings to other settings and populations.

Significance

This study will contribute to the advancement of e-waste disposal and management by school districts in the United States, and hopefully across the globe in the post-COVID-19 pandemic environment given that the implementation of online instructional delivery processes necessitated schools to increase their investments in Chromebooks, iPads, teacher laptops, modems, projectors, interactive boards and other electronic equipment needed to provide online instruction. The researcher considered the current disposal procedures and the expectation that such electronics will reach their end of life in the next 5–6 years. Thus, this study yielded insights into ways through which existing state-level e-waste disposal procedures can be amended to ensure that e-waste surplus is disposed ethically and responsibly through the corporation of both school districts and organizations purchasing the electronics at auction. The

contributions of the study will also serve to protect society from the harm caused by unethical and irresponsible disposal of e-waste by providing research-based recommendations that can help both school districts and organizations implement the stipulated disposal procedures to reduce the negative impacts of environmental/ecological pollution.

Summary

The purpose of this study was to determine whether the implementation of the State of New Mexico's Manual of Procedures Public School Accounting and Budgeting Supplement 12 Capital Assets by the Southern New Mexico School District leads to the ethical and responsible disposal of e-waste in the post-COVID19 pandemic environment. This purpose stemmed from the identified problem that existing measures used under the guidance of the Procedures Public School Accounting and Budgeting requirements may not suffice to ensure efficient and ethical e-waste disposal and recycling by institutions that purchase used electronics from schools owing to the heightened use of electronic gadgets to facilitate online learning during and after the pandemic. The focus of the study was also based on the acknowledgment that electronic gadgets have a 5–6-year life span necessitating the development of novel measures to facilitate e-waste disposal. The theoretical framework for this study was the sustainability theory, which encompasses economic, social, and environmental facets. Chapter 2 involves reviewing current literature regarding the phenomenon under study.

Chapter 2: Literature Review

The purpose of this study was to investigate whether the implementation of the State of New Mexico's Manual of Procedures Public School Accounting and Budgeting Supplement 12 Capital Assets by the Southern New Mexico School District lead to the ethical and responsible disposal of e-waste in the post-COVID19 pandemic period. To write the systematic literature review, I used the following online databases and search engines: Google Scholar, SSRN, NBER, Educational Resource Information Center (ERIC), Wiley Online Library, Ingenta Connect, JSTOR: Journal Storage, EBSCOhost Online Research Databases, ELSEVIER, and Journal Seek. The key search terms and combination of search terms that were input to various online databases included the following: *electronic products, electronic waste, e-waste, electronic waste management, e-waste management, end of life, surplus technology, ethical e-waste disposal, education sector, e-waste recycling, auction, recyclers,* and *sustainability theory*. The key terms used yielded studies that were relevant to the problem and research questions.

The inclusion criteria encompassed literature published between 2019 and 2022 to include latest findings and reports in the review. More importantly, the inclusion criteria included consideration of articles whose title or abstract included at least two of the aforementioned keywords. Therefore, I excluded from the search articles with titles that did not contain any of the keywords. Also excluded were articles published before 2019 except those required to gain insight into the selected theoretical framework.

I used several varieties of supportive literature in this review, including textbooks, academic handbooks, and readers. I used textbooks to introduce the topic of discussion and academic handbooks to identify and highlight ongoing debates and identify research agendas. On the other hand, readers, which included a compilation of landmark journal articles and book

chapters helped develop the topic of this study through insightful considerations of key original texts and chapter overviews. Further, I used supportive literature to create a flow of academic discourse, develop arguments, back up, and challenge claims about information provided by empirical literature and what should be done about it. When such diverse varieties of supportive literature are incorporated into a study, it is possible to acquire insights into systematic approaches to practice, highlight and understand the necessity of proposed changes, and suggest recommendations based on past, current, and anticipated practice alterations (Braun & Clarke, 2019). In this chapter, the theoretical framework is first discussed followed by a review of literature related to the topic under study. The main topics covered in the review of literature section include: the pandemic's effect on the use of electronic devices in the education sector, e-waste management, technology and e-waste recycling, e-waste policies and strategies, end of life and e-waste management, and e-waste disposal through auctioning.

Theoretical Framework

The sustainability theory underpinned this study. Developed during the Brundtland report in 1987, the theory integrates social, environmental, and economic responses to achieve sustainable relations (Redclift, 2005). Further, the theory holds that sustainability requires the reconciliation of the three pillars, which comprise environmental, social equity, and economic demands (Childers et al., 2014). Another chief proposition of the theory is that to achieve a balance between the economy, ecology, and society, it is necessary to have strategic and sensitive sustainable designs (Childers et al., 2014). In principle, sustainability theory has been used to explain an integrated approach to e-waste management, and how system actors, including social, economic, and environmental models, enable sustainability (Redclift, 2005). In this respect, sustainability theory is relevant and useful in providing explanations for developments in

classical e-waste management systems. The principles embodied in the theory are illustrated in Figure 1.

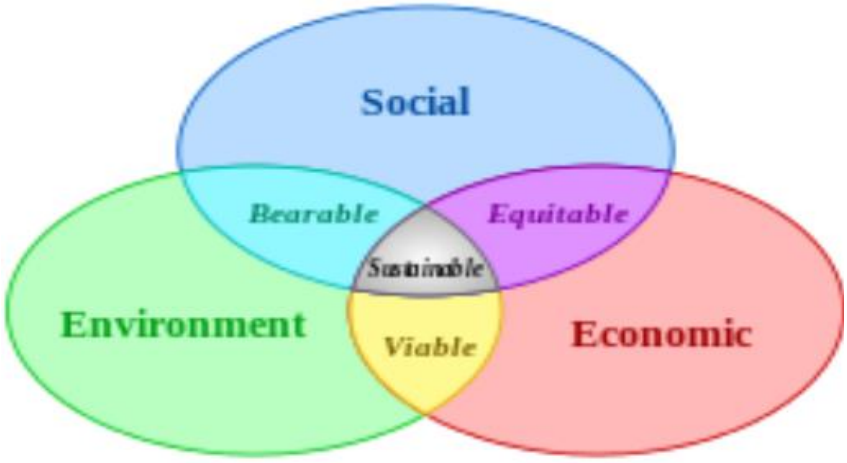

Figure 1: Diagrammatic Representation of Sustainability Theory

Note. Adapted from Childers et al. (2014)

Economic Model

The purpose of the economic model of the framework is to sustain natural and financial capital, which represents the fundamental system in e-waste management. Sustainability interfaces with economics through the social and ecological consequences of economic activity, representing a broad interpretation of ecological economics where environmental and ecological variables and issues are basic but part of a multidimensional perspective (James, 2014). Thus, the economic front of the sustainability framework holds that social, cultural, health-related, and financial aspects have to be integrated into e-waste management. Financial capital is also important to support proper activities of e-waste handling, which have toxic substances and are normally released upon poor disposal leading to environmental degradation (Elzen et al., 2004). As such, Bodies such as the Slouthern New Mexico School District that are involved in helping schools achieve the desired echelons of e-waste disposal through enforcement of the State of

New Mexico's Manual of Procedures also require a lot of financial support to ensure they implement e-waste recycling and disposal with much ease.

Social Model

The social model of the sustainability theory focuses on the formal and informal processes. According to the social model, systems, structures, and relationships are essential in e-waste management to actively support the capacity of current and future generations to create healthy and livable communities (Elzen et al., 2004). As such, socially sustainable communities are equitable, diverse, connected, and democratic and provide a good quality of life. The social model focuses on human life, laws governing human and environmental relations, the relationship between human rights and human development, corporate power, and environmental justice (James, 2014). To achieve sustainability in e-waste management, all aspects of the social model must be observed and protected by organizations involved in e-waste disposal.

Environmental Model

The environmental facet of the sustainability theory addresses the physical and biological factors along with their chemical interactions that affect an organism (Childers et al., 2014). This model is also focused on the built environment, the natural environment encompassing all living and nonliving things, and the social environment, including the culture that an individual lives in and the people and institutions with which they interact. Thus, for the environment to support human and other biological life, it should be protected from degradation by putting measures that include policies and laws, as poor e-waste disposal could lead to environmental degradation given that e-waste contains toxic and in turn affect the social aspect of sustainability (Redclift, 2005).

Review of Literature

The Pandemic's Effect on the Use of Electronic Devices in the Education Sector

As a result of the COVID-19 pandemic, distance learning has led to the heightened use of electronic devices in the education sector. Lau and Lee (2021) explored parents' views on kindergarten and primary school students' distance learning experience and support needed as well as the number of time children spent on screen media at home during COVID-19 class suspension. Particularly, the researchers focused on identifying the increases in electronic device usage due to the suspension of normal learning programs during the pandemic. The basis for this study was that due to the suspension of normal learning programs the education sector had resulted in investments in electronic gadgets to foster online learning for kindergarten and primary school students. Lau and Lee collected data through an online survey focusing on the educational difficulties associated with the pandemic and the necessity of using electronic gadgets to facilitate distance learning during the pandemic. Findings obtained from the study indicated that educational sectors were heavily investing in gadgets such as Chrome books and teacher laptops to foster online distance learning. These findings are consistent with the results obtained by Alsoufi et al. (2020) in their investigation of the impacts of the pandemic on electronic learning. The researchers hypothesized that heightened use of electronic devices was necessary to enable instructors to deliver quality lectures during the pandemic due to the required safety stipulations. Findings obtained from the study indicated that the educational sector was investing heavily in laptops and Chromebooks to facilitate online learning for medical students.

Transitioning to Online Learning and the New Normal

Investments in electronic devices during the pandemic have been focused on helping learners transition to online learning to foster academic performance. Priyadarshini and Bhaumik

(2020) sought to find out the e-readiness of senior secondary school learners for transition to online learning along with their views on this mode of learning transaction. Priyadarshini and Bhaumik used a quantitative descriptive survey with a questionnaire comprising 20 Likert-type items covering four dimensions—access, digital literacy and e-readiness, delivery of online learning, and online load— administered on a 100-student sample from different schools in Delhi using nonprobability sampling. Initial findings from the study indicated that the education sector was concerned with increasing access to online learning amidst the pandemic-associated regulations. Additional findings indicated that the increased use of electronic devices in the educational sector was associated with the need to improve access to online learning and to improve online learning pedagogy effectiveness for both teachers and students.

Mahdy (2020) corroborated Priyadarshini and Bhaumik's (2020). Mahdy investigated the impact of the COVID-19 lockdown on the academic performance of veterinary medical students and researchers. Findings obtained from the study revealed that the education sector was more focused on improving online learning by utilizing electronic devices to make it more interactive, showing medical procedures in real situations, giving concise information, and providing 3D virtual tools to mimic the real situation.

Increases in the use of electronic devices in the education sector as a result of the pandemic have been linked with the perception that online education will become the new normal. Yuliejantiningsih (2020) sought to find how effective online learning policy formulation is, how productive it is in policy implementation, and what are the obstacles to the implementation in early-childhood education. The study was guided by the literature-based realization that the rise of the COVID-19 pandemic had threatened childhood education confusing teachers and parents as they sought to stimulate the student population. The researcher

used a mixed-method research approach with an iterative analysis design that involved 1,899 respondents. After undertaking a quantitative analysis using NViVo 12+, the researcher discovered that in an attempt to mitigate the challenges associated with the pandemic's impact on early childhood education, the education sector had increased its investments in electronic gaming devices.

Yuliejantiningsih's (2020) findings are consistent with the results obtained by Xie et al. (2020) in their study of online education as the new normal with a particular focus on the COVID-19 pandemic. The study was guided by the hypothesis that the pandemic created a new normal that further springboards such opportunities to large scale implementation of online education given the advantages of flexibility, information accessibility, global reach, equity, innovation, and efficiency, a growing number of educational institutions are offering degree-granting distance and hybrid education programs. Findings obtained from the study indicated that the post-COVID-19 pandemic would become the new normal forcing education institutions to heighten their investments in electronic gadgets for both teachers and students.

Educational Concerns, Learning Adjustments, and Public Health

Due to the pandemic, educational institutions have invested heavily in electronic equipment to cater to academic loss and improve student performance through online education systems. In a recent study, Clark et al. (2021) estimated the causal effects of the increased use of electronic devices in online education on student exam performance using administrative data from Chinese middle schools. Findings obtained from the study indicated that due to the commitment of the Chinese educational sector to providing electronic gadgets to students to foster online learning, the student academic results improved by approximately 1.2% during the lockdown. Additional findings indicated that due to the use of electronic devices, students who

received recorded online lessons from external higher-quality teachers had higher exam scores than those whose lessons were recorded by teachers from their school.

Clark et al.'s (2021) findings are consistent with the results obtained by Xue et al. (2022) in a study of the online education action for defeating COVID-19 in China from the perspectives of the system, mechanism, and mode. Particularly, Xue et al.paid attention to the heightened use of digital devices in the country's education sector, and the policy development of online education in China during the epidemic including the education informatization policy, the online education system, and the online education mechanism in China. Findings obtained from the study indicated that the country's education sector was keen on increasing the use of electronic gadgets in schools to improve online education and teaching mode during the epidemic through synchronous live class-based teaching mode, asynchronous recording and broadcasting teaching mode, online flipped classroom teaching mode, and online tutoring-based teaching mode.

The heightened use of electronic devices during the pandemic has led to public health, environmental, and educational concerns. Agarwal et al. (2021) explored the effects of e-learning on public health and the environment during the COVID-19 lockdown. Particularly, Agarwal et al. focused on providing insights about three different online services, namely Google Classroom, Zoom, and Microsoft Teams being used by three different educational institutions. Therefore, Agarwal et al. aimed to analyze the efficiency and acceptability of e-learning tools among Indian students during the COVID-19 lockdown. Findings obtained from the study indicated that the heightened use of electronic devices in an educational setting and their consequent remarkable levels of acceptability were closely linked to improvements in public health and educational attainment among students. These findings are consistent with the results

obtained by Radha et al. (2020) in their exploration of the e-learning process among students who are familiar with web-based technology amidst the COVID-19 pandemic. To establish the student's attitudes toward e-learning, Radha et al. collected primary data from national and international wise through Google forms, which included the student community from various schools, colleges, and universities. Findings obtained indicated that students' interest in using e-learning resources was closely linked to public safety and improved performance.

The ascendancy in the use of electronic devices during the COVID-19 pandemic has been associated with their usefulness as an educational resource and the possibilities they have offered in turning the crisis brought about by the pandemic into an opportunity. Chavarría-Bolaños et al. (2020) explored e-learning in dental schools during the COVID-19 pandemic with a particular focus on the utilization of electronic devices as educational resources. The study was guided by the literature-based realization that the closure of university facilities had forced educational institutions to transfer some courses to a virtual modality. Most dental schools, however, have been challenged to deal with a situation that requires emergency measures to continue the academic course in the middle of lockdowns and social distancing measures. Findings obtained from the study indicated that dental schools were attempting to catch up with the electronic resource and internet-based learning resources provided by other faculties by investing heavily in laptops, Ipads, and Chromebooks. These findings were corroborated by Hani et al. (2021) in their assessment of medical students' satisfaction and knowledge attainment through distant learning during the COVID-19 pandemic. The targeted population was the students at the school of medicine, and Hani et al. created an online questionnaire using Google Forms. Findings obtained from the study indicated that 63.36% of the student respondents believed that the heightened use of electronic devices and the investments in such gadgets by medical faculties were closely

related to their ability to serve as educational resources facilitating improved educational attainments despite the negative impacts of the pandemic.

Although e-waste has been a global crisis even before COVID-19 hit, the amount of e-waste has been rising steadily due to the outbreak and the adjustments it necessitated in the education sector, which calls for improved e-waste management measures. Abdullah Rizzal et al. (2021) explored the antecedents of university students' intention to practice e-waste recycling. The study was driven by the literature-based realization that during the pandemic, most of the education systems worldwide switched to a new method of fully online learning requiring every student to utilize electronic devices and gadgets to engage with the new method of learning. Having projected rises in the amount of e-waste generated owing to the massive usage of gadgets and electronic devices during the pandemic, Rizzal et al. considered the possibility of engaging students in e-waste disposal management. Findings obtained from the study indicated that in the United States only some e-wastes were recycled properly, and the rest was shipped to Hong Kong, Latin America, and the Caribbean whereas a high quantity of e-waste was managed under improper methods by informal collectors in several nations, especially in Asia and Africa, such as China, Bangladesh, India, Thailand, Vietnam, Nigeria, and Ghana. These findings are consistent with the results obtained by Murthy and Ramakrishna (2022) in a study to identify the global best practices in the field of e-waste management and to reveal the importance of policy implementation, technology requirements, and social awareness to arrive at a sustainable and circular economy. After paying attention to the education sector, Murthy and Ramakrishna discovered that the recent increases in electronic device use due to the pandemic required e-waste policy adjustments to avoid excessive harm to the environment and to ensure natural resource sustainability.

E-waste Management

Management of e-waste requires policy amendments to cope with increases in electronic gadget use and anticipated end-of-life breakdowns as a result of the COVID-19 pandemic. Negrete-Cardoso et al. (2022) investigated circular economy strategy and waste management in relation to the post-COVID-19 dispensation. Negrete-Cardoso et al. carried out a descriptive analysis of 416 documents using bibliometric techniques to gather existing knowledge in circular economy focusing on waste management with a particular focus on documents between 2007 and 2020. Findings obtained from the study indicated that annual scientific production increased by 94% in the last 5 years, highlighting the countries of Italy, Spain, the UK, China, Brazil, and India. Among the most cited documents were those related to the calorific value of municipal solid waste and waste-to-energy technologies for achieving circular economy systems. The conceptual analysis indicated a strong linkage between circular economy and sustainable production, waste management, and recycling. These findings were corroborated by Rashed et al. (2021) in their study to report how the repair and e-waste worker communities adopted various changes to their work, provided remote services, and yet faced a decline in their business. Based on interviews with 30 repair and e-waste workers and 21 users of electronic devices, Rashed et al. captured various aspects of e-waste disruption and the corresponding coping mechanisms required to facilitate e-waste management in the educational sector.

The environmental waste implications associated with the rise of electronic device usage during the COVID-19 pandemic require efforts to mitigate challenges associated with solid waste management. Recently, Jebaranjitham et al. (2022) investigated the current scenario of solid waste management techniques and challenges in Covid-19 to give an overview of different types of waste management techniques that are effectively followed by different countries and

the action plans that need to be followed. Jebaranjitham et al. recognized that waste management is the key infrastructure to be developed in society, but so far it is not recognized as much in many developing countries, especially in relation to the pandemic. The review of the literature was focused on the global current scenario of waste generation and its management methods. Findings obtained from the study revealed that e-waste management challenges and the corresponding environmental implications were associated with the phases of waste management services such as collection and transport, various techniques adopted for waste management, and policies and legislation post-Covid-19.

The findings by Jebaranjitham et al. (2022) are consistent with the results obtained by Adejumo and Adejumo (2020) in their investigation of electronic device usage increases associated with telemedicine and the corresponding environmental implications. Adejumo and Adejumo realized that the imposition of lockdown, quarantine, and isolation measures by most countries to curtail the spread of the coronavirus led to the rapid development of information, communication, and technological solutions to minimize the effect of the lockdown, and as an alternative to normal day-to-day physical interactions. Findings obtained from the study indicated that e-waste management challenges were linked to a lack of infrastructure for the effective implementation of policies required to appropriately manage e-waste.

Waste Generation, Collection, and Recycling

Sustainability in the post-COVID-19 dispensation will require increased focus on understanding waste generation, collection, and recycling. Recently, Dias et al. (2022) investigated e-waste management in Brazil. The researchers realized that despite being one of the main producers of e-waste in the world, the country's waste management system does not encourage a circular economy. The study stemmed from the literature-based realization that

Brazil lacks reliable data on important metrics such as rates of collection and recycling and the destination of resources the slow regulatory process notwithstanding. Dias et al. obtained primary data to bridge this information gap by mapping and interviewing e-waste recyclers in Brazil. Findings obtained from the study revealed that large facilities had the most automated processes yet e-waste management was impeded by a lack of accurate understanding of the waste generation process, leading to recycling challenges. These findings were corroborated by Adnan et al. (2022) in their exploration of the effects of heavy metals, waste, and COVID-19 on the ecosystem. Adnan et al. noted that although scientists were currently concerned with understanding the process of waste generation, the lack of attention to the recycling process impeded the effectiveness of e-waste management policies. Findings obtained from the study indicated that the increased use of electronic devices during the pandemic and lack of proper insights into the relation between e-waste generation and recycling had caused recycling to become a new source of environmental pollution.

Stakeholder Involvement

Effective e-waste management in the post-COVID-19 environment requires comprehensive stakeholder involvement to mitigate the hazardous influences of e-waste on the environment and human beings. In a recent study, Sharma and Prince (2022) explored the usefulness of the inclusive stakeholder model as part of the post-COVID strategy for improved e-waste management. The study was conceptual, where Sharma and Prince accessed and studied the literature related to e-waste management in developed and developing countries to develop a post-COVID-19 strategy to handle e-waste in India. Sharma and Prince found that the inclusive circular holistic approach would be useful when executed by encompassing the interests of

various stakeholders as active intervention, especially for the developing nations, which highly depend upon the wider informal sector to manage e-waste.

Sharma and Prince's (2022) findings are consistent with the results obtained by Alabanza et al. (2022) in a study of how the pandemic has affected e-waste generation and management systems in the Philippines using online surveys and over-the-phone interviews involving various stakeholders such as Filipino electronics consumers, electronics manufacturers, junk shop owners, environmentalists, and policymakers. Overall, the researchers discovered that environmentalists and professionals in e-waste management identified a lack of public awareness and the absence of ample stakeholder involvement as the chief impediments to improving the e-waste management system and recommended that public and private bodies engage in joint efforts to create comprehensive guidelines regarding the manufacture, consumption, and disposal of electronics.

Technology and E-waste Recycling

Advancements in e-waste recycling have been impacted by technology leading to enhancements in views about e-waste generation and resource recovery. Jadhao et al. (2022) critically assessed e-waste recycling with a particular focus on metal recovery. Jadhao et al. hypothesized that technological advancements in the field of electrical and electronic equipment lead to the rapid increase in the obsolescence rate of these devices and the generation of e-waste. According to Jadhao et al., the problem of e-waste recycling and recovery is exacerbated due to the limited awareness about disposal methods of e-waste coupled with limited viable recycling avenues. Further, Jadhao et al. noted that rising demand and limited recycling capacity further lead to increased resource extraction and mining activities having a degenerative impact on biota. Findings obtained from the study indicated that technology led to advancements in understanding

e-waste generation helping avoid improper recycling and unregulated accumulation of e-waste. These findings are consistent with the findings obtained by Rene et al. (2021) in a study in which they explored the impact of technology on e-waste generation, recycling, and resource discovery. The study stemmed from the literature-based discovery that the growing population and increased disposal of end-of-life electrical and electronic products have caused serious concerns to the environment and human health. Findings obtained from the study revealed that rapid technological upgrades paved way for developments in e-waste recycling and recovery methods.

Sustainability and Theoretical Approaches

Technology has helped mitigate the risks associated with e-waste recycling creating room for sustainability through metal extraction and recovery methods. Asante et al. (2019) investigated the risks and opportunities presented by technological advancements with a particular focus on e-waste recycling in Africa. Asante et al. hypothesized that Africa, being the fastest growing economy, has experienced an increase in the importation of electronic and electrical goods and in the implementation of information and communication technologies, which has necessitated the use of upgraded e-waste recycling technologies. According to Asante et al., inadequate infrastructure for e-waste management and nonenforcement of laws led to the release of multitudes of hazardous substances due to the crude way e-waste is recycled and the risks posed to humans and the environment. Findings obtained from the study indicated that technological advancements provided methods through which e-waste recycling could be undertaken to reduce harm and generate economic benefits for e-waste collectors. These findings were corroborated by Hsu et al. (2019) in their investigation of the role of technology in improving e-waste processing through improved extraction and recovery technologies. The researchers hypothesized that e-waste is an invaluable unconventional resource due to its high

metal content, as nearly 40% of e-waste is comprised of metals. Findings obtained from the study indicated that emerging technologies could be used to augment the extraction of usable metals from e-waste, leading to reductions in the severity of environmental impacts.

The findings by Hsu et al. (2019) were further corroborated by Nekouei et al. (2019) in their study of the usability of technology in improving e-waste recycling through the application of selective isolation methodologies for heavy metals. Nekouei et al. hypothesized that e-waste management has become an urgent issue in the digitally dependent world owing to the unprecedented use of electronic devices compelling the world to develop new techniques to recycle such wastes. Thus, Nekouei et al. examined the applicability of the technology in combating the problematic and high-volume global waste stream with a particular focus on end-of-life printed circuit boards. Findings obtained from the study indicated that technological advancements could be used in the form of ion exchange (adsorption/desorption) for heavy metals to selectively recover and separate usable heavy metals from other forms of e-waste. These findings are consistent with the results obtained by Roy et al. (2022) in their study of the usability of emerging technologies in augmenting green e-waste recycling methods. The study stemmed from the literature-based realization that e-waste generated from end-of-life spent lithium-ion batteries (LIBs) is increasing at a rapid rate owing to the increasing consumption of these batteries in portable electronics, electric vehicles, and renewable energy storage worldwide. Findings obtained from the study indicated that whereas state-of-the-art recycling of spent LIBs involving pyrometallurgy and hydrometallurgy processes generates considerable unwanted environmental concerns, upgraded technological approaches such as bioleaching, waste for waste approach, and electrodeposition could be utilized to augment green e-waste recycling outcomes.

Modern-day e-waste management strategies through theoretical approaches have been advocated to improve recycling operations. Garg (2021) critically investigated the critical strategies to recover resources along with processing and treatment of toxic and hazardous components of e-waste mitigation and management. Garg also sought to propose a combined framework based on the Grey concept and DEMATEL technique to determine the interdependence among the e-waste mitigation strategies by cause/effect analysis. The study revealed that 'top management initiation and commitment towards return management' is the most imperative and driving strategy in e-waste management and control, especially in cases where theoretical approaches are used to support e-waste recycling strategies in light of existing e-waste policy, directives and regulations. These findings are consistent with the results obtained by Yong et al. (2019) in their analysis of e-waste management strategies and recycling operations in Malaysia. The study stemmed from the literature-based realization that the generation of e-waste had become a significant and current issue in the world bringing about negative environmental and health impacts due to the presence of toxic metals and chemical substances. Findings obtained by Yong et al. revealed that the Grey theoretical concept was being used to foster the acquisition of positive outcomes by improving value recovery from e-waste, especially in relation to precious and base metals.

E-waste Policies and Strategies

Effective e-waste management is dependent on the ability of applied policies and strategies to address sustainability issues by overcoming recycling challenges. Masud et al. (2019) sought to determine the components of effective e-waste management. The study by Masud et al. stemmed from the discovery that a 5–10% annual increase in the amount of used electrical and electronic equipment that are irresponsibly disposed can cause environmental

hazards that have an aversive effect on human health, marine life, contamination of groundwater, and reduced soil fertility. According to Masud et al., without solid e-waste management infrastructures, it would be impossible to address e-waste sustainability challenges, especially in developing nations. Findings obtained from the study indicated that by improving public awareness and allocating financial support to help implement e-waste management policies, it would be possible to delineate the situation of e-waste management sustainability. These findings were corroborated by Tabelin et al. (2021) in a study in which they reviewed the literature to establish the components of effective waste management systems with a particular focus on the challenges associated with recycling from a socio-environmental perspective. Therefore, the researchers critically analyzed ore distribution/processing, metal extraction, e-waste generation, how e-waste recycling is presented, focusing on identifying challenges, and how to address them with emerging technologies and sustainable socio-environmental strategies. Findings obtained from the study indicated that the efficiency of e-waste management strategies when considered from the sustainability perspective depended on e-waste policies and legislation.

Efforts to improve e-waste management should include considerations for the policies and strategies associated with potential applications of resources recovered. Luhar and Luhar (2019) investigated the application of e-waste management strategies with a particular focus on the construction industry. Luhar and Luhar's interest in the topic stemmed from the realization that the application of wastes and their recycled extractions to develop green construction materials had been attracting researchers worldwide owing to the highly pessimistic environmental impact of the Ordinary Portland Cement industry. Therefore, Luhar and Luhar sought to present a review manuscript in an endeavor to reassess applications of abandoned

electrical and e-wastes as supplementary material to develop a variety of green concretes for construction and infrastructure industries. Findings obtained from the study revealed that current e-waste management techniques could be improved by considering the usability of valuable but hazardous elements enclosing e-wastes by employing them as substitution of natural fine or coarse aggregates in concrete manufacturing. These findings are consistent with the results obtained by Gollakota et al. (2020) in their exploration of the inconsistencies in e-waste management in a bid to suggest plausible solutions for developing nations. The study was driven by the literature-based realization that the skyrocketing demand, progressive technologies, and high dependency resulted in inconceivable utilization of electronic devices generating massive volumes of e-waste. Findings obtained from the study indicated that using e-waste, particularly metal for construction could help address the inconsistencies in e-waste management evidenced in developing nations.

Behavioral Reasoning

Behavioral reasoning and circular economy strategies and policies can be used to improve e-waste management outcomes. In a recent study, Parajuly et al. (2020) investigated the concept of behavioral change in relation to e-waste management to determine the potential of integrating lessons from behavioral sciences to facilitate a circular economy in e-waste management. Parajuly et al. discovered that electronic products have in recent years been central to the discussion of resource sustainability due to their growing demand, use of critical resources, and challenges in managing the resulting waste stream. Therefore, Parajuly et al. discussed the notion of circular economy which seeks to 'design out' waste by better products, practices, and business models in terms of its relevance for e-products. Findings obtained from the study revealed that the nature of circular systems mandates a collective behavioral change effort of

businesses, consumers, and governments to improve e-waste management. These findings are consistent with the results obtained by Dhir et al. (2021) after in a study to determine the usability of behavioral reasoning principles in e-waste recycling and management. The interest of Dhir et al. in the topic stemmed from the realization that the past few years have witnessed a growing interest among scholars to examine the behavioral issues concerning e-waste recycling. Therefore, Dhir et al. examined the relative influence of 'reasons for' and 'reasons against' in predicting attitudes and intentions within the context of e-waste recycling by using the behavioral reasoning theory. Findings obtained from the study indicated that in circular economies, behavioral reasoning could help generate the necessary behavioral changes among service providers, policymakers, and governments leading to improvements in e-waste recycling and management.

End of Life and E-waste Management

Assessments regarding electronics' end of life should be considered when addressing e-waste. Gautam et al. (2021) assessed the magnitude of end-of-life e-waste management in India using a forecasting model that projects the amount of waste generated. Gautam et al. realized that technological advances in the solar photovoltaic sector have accelerated, leading to managerial problems for the end-of-life disposal of solar photovoltaic e-waste. According to Gautam et al., developing countries should emulate developed countries by initiating e-waste management systems that take into account the end-of-life of electric-related devices. Findings obtained from the study indicated that using waste management approaches that are based on the end-of-life concept is critical to facilitate the recovery of usable raw materials after recycling and contributing to the growth of circular economies. These findings are consistent with the results obtained by Ambaye et al. (2020) in their study of emerging technologies for the recovery of rare

earth elements from end-of-life e-wastes. The researchers hypothesized that due to the extensive use of high-tech applications in people's daily life and the depletion of their primary ores, the recovery of rare earth elements from secondary sources is needed. Findings obtained from the study indicated that end-of-life considerations are essential in improving e-waste management and recovery of usable metals through emerging technologies such as bioleaching, biosorption, cryo-milling, electrochemical processes and nanomaterials, and siderophores.

Collection Rates, E-waste Flow Forecasting, and Circular Economies

Insights into the end-of-life duration associated with electronics are essential in improving e-waste recycling by fostering collection rates. Shevchenko et al. (2019) sought to explore the incentives that have been used to increase consumer collection rates for end-of-life electrical and electronic equipment. Based on extensive global literature reviews, Shevchenko et al. aimed at proposing an alternative to existing consumer incentives that would rely on data regarding end-of-life and collection improvement measures. Findings obtained from the study indicated that understanding consumer behavior and educating consumers on the end of life would improve the collection of electronic equipment that has reached its end of life leading to improvements in e-waste recycling. These findings were corroborated by Ahirwar and Tripathi (2021) in their study of e-waste management with a particular focus on reviewing the recycling process through the lens of the end-of-life of electronic devices. Ahirwar and Tripathi hypothesized that the exponential growth in e-waste comprising end-of-life electrical and electronic equipment has emerged as a major environmental concern. According to Ahirwar and Tripathi, understanding the end-of-life concept is essential for ensuring the systematic collection of e-waste and its treatment for recycling useful materials. Findings obtained from the study

indicated that the end-of-life concept is a valuable tool to minimize the escalating heap of e-waste, supplement the shortage of some primary resources and support the economy.

Insights regarding the use of electronics and their end of life can help forecast e-waste flows leading to effective e-waste management. Rautela et al. (2021) investigated e-waste management and its effects on the environment and human health, specifically the inappropriate recycling protocols of e-waste and their toxic effects. Findings obtained from the study indicated that an inventory of end-of-life electronic products, which can be established through the creation of an environment-friendly regulatory regime for recycling, is essential for the proper forecasting and control of e-waste. These findings are consistent with the results obtained by Althaf et al. (2019) in a study of the ways through which forecasting e-waste flows can help improve e-waste management for more effective circular economies. Althaf et al. noted that the challenge in predicting e-waste flows was often linked to a lack of insights regarding e-products end of life. Findings obtained indicated that the use of end-of-life models could help develop logistic forecasting approaches leading to heightened improvements in e-waste collection and recycling.

Understanding the end-of-life concept can help improve the recovery of usable metals from e-waste fostering the effectiveness of circular economies. Ding et al. (2019) explored approaches that could be used to augment e-waste management with a particular focus on the impacts of end-of-life on the recovery of precious metals from e-waste. According to Ding et al., although precious metals are widely applied in many industry fields due to their excellent corrosion resistance, good electrical conductivity, and high catalytic activity, their reserves often fall short of production globally. Thus, Ding et al. hypothesized that understanding and applying the concept of end-of-life is critical to filling this production gap because the rapid generation of

end-of-life products has become a significant resource of precious metals. Findings obtained from the study indicated that the acquisition of applicable insights regarding the end-of-life concept could significantly help improve the e-waste process leading to the recovery of precious metals from e-waste.

The findings of Ding et al. (2019) are consistent with the results obtained by Shevchenko et al. (2021) in a study in which they aimed to search for progressive solutions in the e-waste collection sphere with close-to-zero transport and infrastructure costs and the minimization of consumers' efforts towards an enhanced e-waste management efficiency and collection rate. Findings obtained from the study indicated that by deploying a smart reverse system of e-waste from end-of-life electronics holders to local recycling infrastructures based on intelligent information technology tools involving local delivery services to collect e-waste and connecting with interactive online maps of users' requests it would be possible to improve recovery of usable metals.

E-waste Disposal Through Auctioning

Organizations and modern-day institutions often auction their used electronic devices to other firms as a disposal strategy. Maphosa and Maphosa (2020) explored the state of e-waste management at Zimbabwe's higher education institutions. The study stemmed from the literature-based realization that although developing nations have recorded double-digit annual growth in information and communications technology usage, only a few countries in the sub-Saharan Africa region have enacted policies to enforce the management of e-waste, making e-waste one of the emerging solid waste challenges. Thus, Maphosa and Maphosa collected data from 17 higher education institutions, which revealed that the majority of the participants did not know the national e-waste policy. Additional findings indicated that all institutions stored

obsolete equipment in their storerooms for a while before disposing them by auctioning them to staff members and the public, whereas some of the e-waste was disposed in dumpsites. These findings are consistent with the results obtained by Yang et al. (2021) in a study that included a cost-benefit analysis of metal recovery from e-waste to determine implications for international policy. Findings obtained from the study revealed that in most countries, organizations disposing of e-waste relied on the auction method implying that the original owners of the electronics played a minimal role in the recycling process.

Auctioning has become one of the most welcoming alternatives for organizations that seek to dispose e-waste. Maphosa (2021) investigated students' awareness and attitudinal dispositions to e-waste management practices at a Zimbabwean University. Maphosa noted that campuses from developing countries often import used electronic and electrical equipment to improve students' access to technology and that lack of explicit action plans on handling e-waste and the absence of infrastructure in developing countries are significant challenges. Maphosa collected data from 216 students through an online questionnaire and analyzed the data using Statistical Package for Social Sciences version 26. Findings obtained from the study revealed that whereas students disposed of e-waste with municipal waste, their campuses relied on auctions to get rid of used and unwanted electronics. These findings are consistent with the results obtained by Pedro et al. (2021) in their investigation of the extent to which constructed governance served as a solution to conflicts associated with e-waste recycling networks. The main proposition was that constructed governance, which is a collective process involving many actors, could be an alternative to e-waste recycling management. Findings obtained from the study indicated that constructed governance increased the reliance of institutions on auctioning as a way of disposing of e-waste.

E-waste management practices have often been deemed informal because most developing countries rely on the auction strategy. Bimir (2020) attempted to revisit the e-waste management practices in African countries. According to Bimir, African African countries are among the prime destinations of electronic waste (e-waste) also called waste of electrical and electronic equipment, and have been challenged with the management of its environmental and health impacts. Therefore, Bimir sought to understand the e-waste sector and policy responses in selected African countries. The data sources for the study were policy documents, legislations, and the literature. Findings obtained from the study revealed that large organizations auction their e-waste stocks inviting all authorized recyclers. These findings are consistent with the results obtained by Laha (2022) in their investigation of e-waste informality in India. Laha hypothesized that the informal sector occupies a significant position and proportion of the modern-day configuration of global e-waste recycling networks. Thus, Laha used the global production network framework to determine the value of trust and social networks in organizing the predominantly informal e-waste processing activities in India. Findings obtained from the study indicated that due to the recurrent legislative endeavors to stifle informal e-waste operations, large organizations had turned to the auction alternative.

Investors and E-waste Auctioning

Investors play a chief role in removing barriers associated with e-waste management by funding individuals and organizations to purchase e-waste. Maheswari et al. (2020) explored sustainable reverse logistics scorecards for the performance measurement of informal e-waste businesses. Maheswari et al. described investors as individuals or organizations that provide the fiscal support required to buy e-waste components in large amounts and at good prices. Maheswari et al. focused particularly on the role that investors play as stakeholders in e-waste

management taking into account parameters associated with internal business processes. Findings obtained from the study indicated that due to the involvement of investors that have caused the domination of informal businesses in many developing countries environmental rules are not considered after auctions during e-waste disposal, and these violations tend to affect public health adversely. These findings are consistent with the results obtained by Chen et al. (2020) in their study to identify and evaluate barriers and pathways to the implementation of e-waste formalization management systems in Ghana. Chen et al. noted that informal e-waste management practices in Ghana have become a critical challenge to the government and the various stakeholders owing to their environmental and health impacts. Findings obtained from the study revealed that the involvement of investors led to e-waste management formalization issues as well as problems associated with ethical and responsible e-waste disposal.

Auctioning and Unethical E-waste Disposal

Reliance on auctions to dispose of e-waste has led to unethical e-waste disposal. Hussain et al. (2020) explored India's informal e-waste recycling. The study stemmed from the observation that India is less knowledgeable when it comes to the formal recycling of e-wastes noting that recycling is taken into account informally through auctions to make a profit in terms of money. Further, Hussain et al. indicated that informal recyclers in the country after the purchase of e-waste adopt current techniques such as pyro-metallurgy, hydro-metallurgy, and electro-metallurgy. Findings obtained from the study indicated that after the extraction of precious metals, the remaining residues are not properly dumped into landfill sites by the purchasers. Additional findings by Hussain et al. revealed that the purchasers of e-waste throw the residues on land without any ethical precautions. These findings are consistent with the results obtained by Giri and Adhikari (2020) in their study to determine the urgency of proper e-

waste management approaches in Nepal. Giri and Adhikari hypothesized that since electrical and electronic devices become tomorrow's waste, the potential hazards of these materials in an open environment are significant, as they can contaminate soil, drinking water, and air and thus directly affecting human health and surrounding biota. Findings obtained from the study indicated that reliance on auctions for e-waste disposal led to heightened environmental problems because of the purchasers after recycling disposed of the residues without adhering to e-waste disposal policies.

Purchasers of e-waste process the resulting e-waste residues in a crude manner necessitating considerations into other avenues of e-waste collection. Sajid et al. (2019) assessed the generation, recycling, and disposal practices of e-waste from major cities in Pakistan. The study was driven by the literature-based discovery that to avoid higher expenditures on safe disposal and recycling, large quantities of e-waste were being exported from developed to developing countries. Sajid et al. hypothesized that auctions could not solve the problem of ineffective e-waste management until an assessment of e-waste quantification and disposal is carried out. Thus, Sajid et al. focused on auction activities as well as the information on e-waste items such as desktop computers, laptops/notebooks, computer monitors, and liquid-crystal display units. Findings obtained from the study revealed that purchasers of such e-wastes did not pay attention to recycling and disposal strategies that protect the environment. These findings are consistent with the results obtained by Tiwari et al. (2019) in their investigation of existing collection systems in Asian countries. Tiwari et al. hypothesized that e-waste being a post-consumer waste needs to be collected from the various sources of its generation. Findings obtained indicated that there was increased reliance on auctions leading to heightened irresponsible and unethical disposal of e-waste.

Summary

The COVID-19 pandemic led to hefty education sector investments in electronic gadgets and increased use of electronics such as Chromebooks, laptops, and modems, which have become a threat to both the environment and humanity, as reflected in the corresponding escalations in e-waste. The review of literature has helped establish that the education sector is expected to contribute higher volumes of e-waste because of the heightened investments in electronic devices to foster academic performance (Priyadarshini & Bhaumik, 2020) driven by the belief that online education has already become the new normal (Xie et al., 2020). Further, the use of electronic devices during and after the pandemic is associated with public health concerns and the required learning adjustments (Clark et al., 2021) necessitating more efficient e-waste management measures, especially in the education sector given that the electronic gadgets being used are anticipated to reach their end of life. Therefore, sustainable, ethical, and responsible e-waste disposal may not be achieved by relying extensively on the auctioning of electronic products that are no longer usable, rather by exploiting technological advancements to design e-waste disposal policies and strategies that improve e-waste recycling after auctions take place (Jadhao et al., 2022; Masud et al., 2019). Whereas it may not advisable for the education sector to do away with the e-waste auctioning alternative, school districts must evaluate purchasers of e-waste to ensure that they are capable of guaranteeing ethical and responsible disposal of e-waste residues after they complete the recycling and recovery process.

An observation made when examining the references in the literature reveals that the majority of the research on e-waste management is based outside of the United States. Unlike all other developed countries, the U.S. lacks a national policy on e-waste exports. According to the (Coalition for American Electronics Recycling, 2023), the U.S. is one of a handful of countries

that have not ratified the Basel Convention, a global treaty that restricts exports of e-waste because it contains hazardous materials, because it does not have sufficient domestic statutory authority to implement all of its provisions.. Findings obtained from the study by (Rizzal et al. 2021) indicated that in the United States only some e-wastes were recycled properly, and the rest was shipped to Hong Kong, Latin America, and the Caribbean whereas a high quantity of e-waste was managed under improper methods by informal collectors in several nations, especially in Asia and Africa, such as China, Bangladesh, India, Thailand, Vietnam, Nigeria, and Ghana. There appears to be a economic political trade because of the U.S.'s strong political influence on other countries and these countries want something from the U.S. The researchers conducting the studies on e-waste come from the countries that are being most affected by this practice and they are representatives of higher education institutions.This study will make make a significant contribution in the K-12 educational context in the United States.

Chapter 3: Methodology

The purpose of this sttudy was to determine whether the implementation of the State of New Mexico's Manual of Procedures Public School Accounting and Budgeting Supplement 12 Capital Assets by a Southern New Mexico School District leads to the ethical and responsible disposal of e-waste in the post-COVID19 pandemic period. The electronic devices purchased during the Covid-19 pandemic equipment such as Chromebooks, laptops, modems, projectors, and other electronic to facilitate online instruction in schools and colleges will reach their end of life in 5–6 years between 2025 and 2026 (Singh, 2022). Chapter 3 contains a description of the research methods used to address the research problem along with the justifications for using them. The major sub-sections of Chapter 3 include the research design and rationale, role of the researcher, methodology, data preparation and analysis, issues of trustworthiness, and summary of ethical considerations.

Methodology

The methodology section contains a detailed discussion on the selection of research participants, study population, and sampling strategy used in the current study. This section also included participant identification and inclusion criteria and procedures for participant identification. The attainment of sample size through saturation is also discussed.

Participant Selection Logic

The initial plan was to recruit 12-15 participants. The researcher recruited 13 study participants from a Southern New Mexico School Ditrict in the State of New Mexico to take part in a focus group discussion and individual semistructured interviews, three took part in the focus group discussion and 10 participated in the interviews. The sample comprised both male and female participants and were predominantly Hispanic.The target population was associate

superintendents for finance and support services, finance personnel, district personnel who track inventory, director for technology, and support services personnel. The participants were a purposive sample of staff members in this school district who were involved in e-waste management at the time of this study. The participants were not influenced by any organizational or personal conditions. In addition, no such conditions influenced their experience at the time of study because there were no changes of personnel, budget cuts, or other trauma. Thus, no organizational or personal conditions influenced the interpretation of the results .

The real names of the participants were known to the researcher. Nevertheless, because participant confidentiality and anonymity were paramount in this study, the use of pseudonyms was a key consideration. Therefore, the researcher created a pseudonym for each participant and used it instead of their real name. The use of pseudonyms was in line with the qualitative methodology. Assigning a pseudonym to every interview and focus group participant helped protect their identity. Each of the 13 participants stated that they were willing and prepared to engage in the focus group discussions and semistructured interviews that lasted for up to 60 minutes. In terms of age, most participants were in their 40s. The participant demographic information is depicted in Table 1.

Table 1: *Participant Demographics*

Participant pseudonym	**Gender**	**Age**	**Ethnicity**	**Role**	**Years in Current Position**
Interview Participants					
Interview Participant 1	M	40-49	White	Director	3 years
Interview Participant 2	M	40-49	Hispanic	Warehouse Supervisor	26 years
Interview Participant 3	M	30-39	Hispanic	Field Technician	4 years
Interview Participant 4	M	40-49	Hispanic	Field Technician	4 years
Interview Participant 5	M	30-39	Hispanic	Warehouse Inventory	3 years
Interview Participant 6	M	20-29	Hispanic	Field Technician	4 years
Interview Participant 7	M	50-59	Hispanic	Technology Services	4 years
Interview Participant 8	M	40-49	Hispanic	Warehouse Inventory	10 years
Interview Participant 9	F	50-59	Hispanic	Fianance Personnel	8 years
Interview Participant 10	F	50-59	Hispanic	Support services personnel	7 years
Focus Group Participants					
FG Participant 1	M	50-59	White	Director for Technology	4 years

FG Participant 2	F	50-57	Hispanic	Associate Superintendent	3 years
FG Participant 3	F	40-49	Hispanic	Associate Superintendent	7 years

The logic for selecting New Mexico and the Southern New Mexico School District is because of the convenience as the researcher's resident area. Additionally, New Mexico is one of the states that have passed the Solid Waste Act that prioritizes source reduction and recycling, with environmentally safe transformation (Powell & Chertow, 2019). The Act applies to school districts as the source of e-waste. The sampling method used to select institutions for the study was convenience sampling method.

The inclusion criteria for the institutions were as follows: (a) a school district in the New Mexico State and (b) implements New Mexico's Manual of Procedures Public School Accounting and Budgeting Supplement 12 Capital Assets for e-waste disposal. Excluded from this study were campus-based technology inventory personnel and the principals.

Instrumentation and Data Sources

The sources of data for the current study were three: archived records, focus group discussions and semistriuctured interviews with participants. Archived data aided in examining data for trends, comparisons, and interpreting the outcomes based on the research questions. The processing entailed synthesizing open records related to the disposal and recycling of electronic materials to determine whether e-waste was ethically managed as per the Manual of Procedures Public School Accounting and Budgeting Supplement 12 Capital Assets. The records are reputable legal documents because they are produced per the States Solid Waste Act and Manual of Procedures Public School Accounting and Budgeting Supplement 12 Capital Assets. After synthesizing and interpreting relevant documents on e-waste disposal, the next step will be generating a set of questions and statements that require further clarification for focus group discussions. Therefore, the sources of data were focus group discussion and semistructured

interview protocols developed by the researcher to collect primary data and archived records for secondary data archived on the district website.

The researcher captured screenshots of open records of relevance to this study with a computer for further scrutiny and analysis to answer the research questions.These records were available on the district's website The researcher also recorded focus group discussions on a computer for verbatim transcription and analysis. As stated earlier, the literature review and research questions were the basis for identifying the type of data documents for this analysis. The researcher developed a focus group discussion protocol from analyzed archived documents, research questions, and literature review (see Appendix A).

Because archived records may not provide adequate information to answer the research questions, the researcher expected that focus group discussions would fill this gap. Focus groups have proved to be an effective tool for collecting qualitative data in social sciences (Haider et al., 2020). The key benefits of focus group discussions include flexibility, which allows the researcher to probe participants to gain sufficient information to enhance the credibility of the outcomes (Bearman, 2019). Further, the researcher controls the session to ensure that only relevant responses are discussed to optimize time and resources. A focus group protocol allows participants to discuss and brainstorm on issues of relevance in their own words and enables the researcher to probe issues that emerge during discussions (Bearman, 2019). Unlike interviews and surveys, participants in focus groups contribute together, resulting in a more diverse perspective on the study phenomenon than with one participant. In the current study, one focus group discussion occurred with three participants. The participants in the focus group discussion were individuals from the school district.

Recruitment Procedures, Participants, and Data Collection

The recruitment procedure involved seeking site and institutional approval, inviting participants, screening participants and obtaining their consent to be respondents, and conducting focus group discussions. The process started with identifying a school district from several districts in New Mexico. The sampling method used to select a school district that was convenient to the researcher in terms of accessibility and with contacts that could be used to improve the process of recruitment was convenient sampling (see Etikan et al., 2016). The selected school district was a Southern New Mexico School District . The researcher sought permission from superintendent to use the Southern New Mexico School District as the study setting and recruit district staff to participate in the research. The researcher also acquired open documents relevant to the study from the School Board Minutes which were available on the district website. I used site approval to obtain my college's Institutional Review Board approval before conducting the study. The next step was identifying staff members involved in e-waste management through the help of the director for technology. I sent request letters to these participants inviting them to participate in the research. Willing participants responded via my email address included in the request letter and consequently completed a screening survey questionnaire to identify those eligible to participate in the study. I then sent a consent form to eligible respondents for signing to confirm their voluntary participation in the study.

For the focus group, the researcher identified potential participants and contacted them through a request letter inviting them to participate in the study and subsequently screened to determine their eligibility. The screening for eligible participants followed through a survey questionnaire based on the inclusion criteria. The participants then signed a consent form sent to them via email before participating in the focus group discussions via Zoom to examine whether

the implementation of Manual of Procedures Public School Accounting and Budgeting Supplement 12 Capital Assets leads to the ethical and responsible disposal of e-waste in the post-pandemic period.

A sample of three individuals participated in the focus group discussion and 10 participated in the individual semistructired interviews. The semistructured interviews and focus group discussion lasted for 45–60 minutes. The interviews and focus group included both semistructured and open-ended interview questions. Saunders et al. (2018) asserted that saturation is likely to be reached at 12–15 participants. The point of saturation is attained when additional participants provide no new information needed to address the research question (Vehovar et al., 2016). The saturation point is likely to be attained between the 6th and 10th participants in the focus group discussions (Haider et al., 2020). Similarly, Sandelowski et al. (1997) observed that recruiting a large sample for qualitative study threatens the interpretive validity of the outcomes and prevents deep analysis. No new participant was recruited after reaching the saturation point because the data and information needed in the current study were adequate, and coding of data and identifying new themes was no longer feasible (see Saunders et al., 2018). Sandelowski et al. also observed that a larger group of people in the focus group discussions may limit the detail of some responses as participants feel the pressure of sharing airtime among themselves.

The method used for sampling of participants was the purposive sampling. The researcher selected 13 individuals from the institution to participate in the focus group discussions and individual semistructured interviews. The purposive sampling technique was relevant in selecting participants who were directly involved in the disposal of e-waste for the school. Additionally, purposive sampling ensured the selection of only those participants who

met the inclusion criteria. Therefore, this sampling method helped recruit respondents with the required information for the study using limited time and resources (see Hennink et al., 2020). The alternative plan was to use snowball sampling method if the purposive sampling technique failed to yield enough participants for the study. Using this method, recruited participants would provide a referral to colleagues involved in e-waste management.

The researcher obtained secondary data in the form of open records from the School Board Minutes for analysis.These records are available on the district website. Because the open documents were accessible to the public, the researcher required no permission to access them or maintain confidentiality. The source of primary data was a focus group discussion and semistructured interviews with the participants via Zoom to gain deeper insights and clarity on key issues of e-waste management in schools. Bryman (2016) suggested that a focus group of 4-5 participants usually works well. A smaller sample size for a focus group generates thick and insightful information on the study phenomenon to the saturation point. The researcher used the auto-record feature to audio record focus group discussion and stored the recordings on a computer for verbatim transcription. The next step was encrypting all electronic data and securely storing them on the computer with a password to deter unauthorized access. After the discussion, the researcher debriefed the participants to invite them to provide any additional information they may have that can be useful to the research, enquired about their availability for any follow-up if it may be needed, and appreciated them for dedicating their time to participate in the focus group discussions.

Data Analysis

The analysis of qualitative data followed Clarke et al. (2015). I generated a code inductively based on identified patterns of meaning in the data as opposed to deductively

developing codes based on the previous literature. The steps for the analysis of data from secondary sources and focus group discussion were as follows:

1. Reading and rereading each transcript to generate initial notes of statements or ideas of importance;
2. Formulating preliminary titles is based on themes emerging in the transcript;
3. Merging and clustering similar themes from transcripts together;
4. Identifying common themes across secondary data and transcripts from the focus group discussions; and
5. Finally, writing a dissertation report for subsequent publication (Pietkiewicz & Smith, 2014).

I used NViVo 12+ software for coding of data as recommended by Saunders et al. (2018). I scrutinized any themes that recurred with great intensity. Common themes emerged from coded data based on the research questions.

Issues of Trustworthiness

Trustworthiness in qualitative research has four components that generate confidence in procedures and outcomes. Trustworthy research should be credible, dependable, transferable, and confirmable (Richards & Hemphill, 2018). The credibility component is similar to internal validity in a quantitative study. Credibility refers to the extent to which data are truly interpreted to reflect the views and meaning of participants and archived data. Therefore, credible qualitative research outcomes should reflect the true meaning of data from archived records and participants (Connelly & Peltzer, 2016). The procedures for establishing the credibility of the research outcomes were triangulation, member checking, prolonged contact, data saturation, reflexivity, and peer review as well as expert input and field testing of data collection instrument (see Braun

& Clarke, 2019). Transferability is the degree to which the outcomes can be applied in practice by generalizing them to the larger population, events, and situations. Transferability is synonymous with external validity in quantitative studies. In the current study, I ensured the transferability of the outcomes by providing thick and thorough descriptions and selecting a diverse group of participants (seeKorstjens & Moser, 2018). I provided a thick and thorough description of each stage of the research process from the recruitment of participants to data analysis.

Dependability in qualitative research is equated to reliability in a study and refers to the consistency of measures of instruments to produce the same findings in replicated research (Birt et al., 2016). I achieved dependability for this research using data member checking, triangulation, audit trail, field test, expert input, and proper participant selection based on the inclusion criteria. Confirmability is the objectivity of the study outcomes; for the current study, I achieved confirmability using strategies such as reflexivity and expert input as well as intra- and intercoder reliability to improve the objectivity of the outcomes (Richards & Hemphill, 2018). I made efforts to eliminate sources of subjectivity positioning and bias in the current study (see Nowell et al., 2017). Using direct quotations from participants and archived records enhanced the objectivity of the study outcomes. These strategies enhanced the credibility, transferability, dependability, confirmability, and ultimately the trustworthiness of the study outcomes.

Ethical Procedures

This research complied with all ethical requirements for the study. First, I sought site approval from school district's administration and institutional approval from the Institutional Review Board's committee chair before commencing participant recruitment and data collection (see Reid et al., 2018). The participant received humane treatment and protection from any

potential physical and psychological harm related to their participation in the study as respondents. Participation was voluntary, and participants signed consent forms to confirm uncompelled participation in the study (see Resnik, 2018). The identity of participants also remained anonymous, as I used numbers to identify them rather than their real names. Participants had the freedom to withdraw from the study at any point without giving notice. I kept all information gained from archived records and focus group discussions confidential and secured it from access by third parties through encryption and password on a personal computer. The collected data will be stored for at least 3 years before being destroyed.

Researcher Positionality

I am a professional in environmental conservation dealing with learning institutions on waste management. In this regard, I am conversant and understand the New Mexico Solid Waste Act and Manual of Procedures Public School Accounting and Budgeting Supplement 12 Capital Assets. I also reside in New Mexico within the areas where the selected study institution, a Southern New Mexico School District, is located. The study setting for my research was local and I had close relationships with some staff of this institutions, including those tasked with e-waste management.

Given my professional experience in environmental conservation and associated laws and guidelines in New Mexico, I restrained myself from interfering with participants' views and opinions during focus group discussions and individual semistructured interviews to avoid bias. Instead, as observed by Applebaum (2014), I tracked all participants' actions and reactions in the discussion using the Zoom recording of the focus group and individual semistructured interviews. I used my professional knowledge and experiences to seek clarity and interpret collected data and information. Therefore, my experience in e-waste management was useful in

selecting the correct records needed to answer research questions. As emphasized by Deggs and Hernandez (2018), Additionally, I personally funded my study to avoid any potential conflict of interest from outside financiers.

Summary and Transition

Chapter 3 included a discussion of the research method and procedures followed in this study and their justifications. The study was conducted using qualitative methods. I recruited participants from one school district in Southern New Mexico that was convenient to me. I used purposive sampling to recruit participants. Had purposive sampling failed to yield enough participants, I planned to use snowball sampling approach to recruit additional samples. The data sources included archived records, focus group discussions and semistructured interviews conducted to gain additional data needed to adequately address research questions. These methods and procedures were critical in facilitating the smooth conduct of the research to generate a trustworthy outcome. Chapter 4 includes the analyzed results of data collected from archived records and focus group discussions.

Chapter 4: Results

The problem addressed in this study was that it was not known whether the implementation of the State of New Mexico's Manual of Procedures for Public School Accounting and Budgeting Supplement 12 Capital Assets by a Southern New Mexico School District leads to the ethical and responsible disposal of e-waste in the post-COVID-19 pandemic environment (see Kurniawan et al., 2022). Although the Public-School Accounting and Budgeting requirements allow organizations to purchase used electronic gadgets from schools, the disposal and recycling measures used by such institutions may not be able to address the post-COVID-19 challenges associated with their recycling or disposal responsibilities. According to Adejumo and Oluduro (2021), before the pandemic, individuals and educational institutions that purchased laptops and computers expressed their concerns that they could no longer carry out their responsibility effectively because the computers they bought had become nonfunctional and could not be refurbished.

The purpose of this study was to determine whether the implementation of the State of New Mexico's Manual of Procedures Public School Accounting and Budgeting Supplement 12 Capital Assets by a Southern New Mexico School District leads to the ethical and responsible disposal of e-waste in the post-COVID19 pandemic environment. The following research questions guided this qualitative study:

> RQ1: How do the current Southern New Mexico School District and New Mexico State Surplus Disposal Policies promote the responsible disposal of Chromebooks, iPads, teacher laptops, modems, projects, interactive boards, and other electronic equipment that were purchased for student and teacher use during the pandemic?

RQ2: How does the implementation of the State of New Mexico's Manual of Procedures Public School Accounting and Budgeting Supplement 12 Capital Assets by a Southern New Mexico School District lead to the ethical and responsible disposal of e-waste in the post-COVID19 pandemic environment?

The following section of this chapter is a description of the data collection and data analysis procedures. Following this section is a discussion of the evidence of the trustworthiness of the data and findings. Next, this chapter includes a presentation of the study results. The final section of this chapter is a summary.

Data Collection

The sources of data to address the research questions of this study were focus group discussions and isemistructured interviews with participants, as well as archived records from the district's website. A total of 13 participants participated in this study. This number was appropriate to conduct in-depth semistructured interviews and a focus group discussion. The actual sampling technique used to select the participants was a purposive sampling strategy. The researcher used archived data to examine trends, perform comparisons, and interpret the outcomes based on the research questions. Overall, a focus group discussion protocol and semistructured interview protocol developed by the researcher were the source of primary data, and archived records were the source of secondary data.

The semistructured interviews and focus group discussion lasted for 45–60 minutes. The interviews and focus group included both semistructured and open-ended interview questions. The researcher recorded primary qualitative data using a digital voice recorder after obtaining permission from the respondents. The researcher also took notes using a paper and pen in each

interview and in the focus group discussion for backup in case something happened to the digital voice recorder and all the digital data got lost.

With a sample size of 13 participants, it was possible to reach data saturation. The researcher used a guide in every interview and in the focus group discussion and probed by asking follow-up questions. Probing was particularly suitable when the researcher had not clearly understood a certain response, when the answers were not clear, and when the researcher wanted to obtain more specific information from the participants. The researcher did not come across any unusual circumstances when gathering data.

Data Analysis

In this study, the researcher analyzed verbatim transcripts from 10 individual interviews and one focus group discussion and archived documents using NViVo 12+ qualitative data analysis software. The procedure for the analysis of data followed the inductive, thematic method by Clarke et al. (2015). This procedure comprises six phases: (a) familiarization, (b) generation of initial codes, (c) grouping codes, (d) reviewing themes, (e) defining final themes, and (f) producing results (Clarke et al., 2015). The initial phase of the analysis entailed familiarization with the data. The researcher read and reread the data in full. This step also entailed taking handwritten notes capturing points of potential analytical interest, including repeated phrases, ideas, and keywords, from which codes could be developed in the second phase of the thematic analysis.

The second phase was generating the initial codes. The researcher clustered several excerpts from the interview transcripts into codes that expressed similar meanings and then labeled them with descriptive phrases that indicated the meaning of the data assigned to them. For instance, Interview Participant 3 spoke about not throwing old electronic devices in the

dumpster, saying, “computers, televisions, and all that. We cannot just throw it in the dumpster. We literally have to pay for a company to come and pick them up and dispose of them properly,” and Interview Participant 6 spoke about not throwing anything away directly, saying, “We don't really throw away anything here directly, so that's kind of how we deal with it.” Both of these responses demonstrated that staff members from the school district do not throw away any obsolete electronic items directly into the trash can or dumpster, necessitating the assignment of both responses to the same code labeled, ‘Do not throw away obsolete devices directly into the trash can or dumpster.’ In total, 214 response excerpts were assigned to 26 codes. Table 2 shows the initial codes and the number of response excerpts assigned to each (i.e., the code frequencies).

Table 2: *Initial Code Frequencies*

Initial code	Code frequency in the collected data
Anybody can bid there is no vetting of bidders by the district	4
District effectively implements state's manual of procedures to ensure proper e-waste disposal	8
District follows very specific, although lengthy, process for disposal of e-waste	9
District upgraded its inventory management system during the pandemic	9
Do not throw away obsolete devices directly in the trash can or dumpster	14
E-waste items go through process of erasing hard drives and formatting the devices before disposal	25
E-waste items taken to auction where they are picked up by another company	14
E-waste materials sold separately from other materials	2
Follow state's manual of procedures to dispose district assets properly	14
Inventory the e-waste items and seek approval to dispose	25
Learned the process of proper disposal while on the job	6
Make sure e-waste items are disposed of properly with right company during pandemic	8
Manual is effective in helping school district organize the disposal of e-waste	9
New strategies implemented to address E-waste disposal during pandemic	3
Only dispose of electronic item if broken	3
Repair electronic devices to keep them alive as long as possible before decommissioning them	4
Specific site set aside for picking up and auctioning off e-waste during pandemic	7

Standard protocol in place to prepare the equipment and how it will be stored and sent to the main location	3
Take the obsolete electronic items out of inventory	2
There is a process of disposal of e-waste after the pandemic	19
Use online auction system instead of in-person	4

The third phase of the thematic analysis entailed grouping codes. In this phase, the researcher grouped similar codes to form themes. When dissimilar codes indicated different aspects of the same broader, main idea, the researcher identified them as related and clustered them to create a theme. For instance, the researcher grouped the three codes, 'Do not throw away anything directly in the trash can or dumpster,' 'E-waste items go through process of erasing hard drives and formatting the devices before disposal,' and 'Repair electronic devices to keep them alive as long as possible before decommissioning them,' into a theme because they all indicated that the current school district and state surplus disposal policies promoted responsible disposal of Chromebooks, iPads, teacher laptops, modems, projects, interactive boards, and other electronic equipment purchased for student and teacher use during the pandemic by encouraging erasure of personal information from each device, not throwing obsolete devices directly in dumpsters, and if possible, repairing the devices to keep them alive for as long as possible.

Similarly, the researcher grouped the three codes, 'Inventory the e-waste items and seek approval to dispose,' 'E-waste items taken to auction where they are picked up by another company,' and 'Make sure e-waste items are disposed of properly with right company during pandemic' into another theme because they all indicated that the current school district and state surplus disposal policies promoted the responsible disposal of Chromebooks, iPads, teacher laptops, modems, projects, interactive boards, and other electronic equipment purchased for student and teacher use during the pandemic by requiring inventory of the e-waste materials,

obtaining approval to disposal, auctioning the devices, and disposing them with the right company. In total, four themes emerged from clustering the 26 initial codes.

The fourth phase of the thematic analysis was reviewing the themes. The researcher cross-checked the themes against one another to make sure that the ideas they represented did not overlap. Besides, the researcher compared the themes to the original data to make sure that they indicated patterns in the participants' responses. The fifth phase was naming and defining the themes (see Clarke et al., 2015). Theme definitions are provided in the Results section of this chapter. The sixth phase of data analysis was presenting the results by writing this chapter of the dissertation (see Clarke et al., 2015). As a preliminary overview of the results, Table 3 shows how the researcher grouped the initial codes to form the finalized themes.

Table 3: *Grouping of Codes into Finalized Themes*

Theme **Initial code clustered to identify theme**	**Theme frequency in qualitative data**
Theme 1: Encourage erasure of information from each device, not throwing devices directly in dumpster, and repairing them to keep them alive for as long as possible	43
Do not throw away anything directly in the trash can or dumpster	
E-waste items go through process of erasing hard drives and formatting before disposal	
Repair electronic devices to keep them alive for longer before decommissioning them	
Theme 2: Require inventory of the e-waste materials, obtaining approval to disposal, auctioning them, and disposing them with right company	47
Inventory the e-waste items and seek approval to dispose	
Make sure e-waste items are disposed of properly with right company during pandemic	
E-waste items taken to auction where they are picked up by another company	
Theme 3: State of NM's Manual of Procedures helps school district organize proper disposal of e-waste	20
Manual is effective in helping school district organize the disposal of e-waste	
Standard protocol in place to prepare the equipment and how it will be stored and sent to the main location	
District effectively implements state's manual of procedures to ensure proper e-waste disposal	
Theme 4: School district follows a specific process for e-waste disposal based on State of NM's Manual of Procedures, which ensures proper disposal of e-waste.	42
There is a process of disposal of e-waste after the pandemic	

Follow state's manual of procedures to dispose district assets properly
District follows very specific, although lengthy, process for disposal of e-waste

Evidence of Trustworthiness

Trustworthiness refers to the truthfulness, authenticity, and quality of findings. Four specific criteria are typically used in judging the soundness of qualitative studies: credibility, transferability, dependability, and confirmability (Morrow, 2005). These four elements correspond, respectively, to the quantitative constructs of internal validity, external validity, reliability, and objectivity. The following section of Chapter 4 includes a discussion of how each component of trustworthiness was established in this study.

Credibility

Credibility is the internal validity of qualitative studies. Credibility is concerned with how congruent the findings are with reality (Amin et al., 2020). In addition, it is a measure of the truth value of qualitative research or whether the findings are truthful (Lincoln & Guba, 1985). In this study, the researcher used three key strategies to establish credibility. The first strategy was member checking, which is also referred to as participant validation (Morrow, 2005). After collecting data from the participants, the researcher returned the data to them to check for accuracy and to confirm whether the data resonated with their experiences. The researcher also returned the results to the participants to check for accurateness. All the participants verified that the data gathered from them were correct, establishing credibility.

The second procedure used in this study to strengthen credibility was data triangulation. Data triangulation, according to Noble and Heale (2019), is carried out by comparing results from at least two dissimilar data sources to identify common points and discrepancies to develop a more robust characterization of a phenomenon than a single data would allow. The data sources

for this study were semistructured individual interviews, focus group discussions, and open records. The researcher compared the data from those three sources to identify areas of consistency and discrepancy.

Deviant case analysis was the other strategy used in this research to establish credibility. Deviant case analysis is a technique for ensuring the validity of the interpretation of qualitative data by analyzing outlier data (Johnson et al., 2020). The researcher conducted a deviant case analysis and identified data elements that disconfirmed emergent findings. The procedure involved finding and discussing data that contradicted the explanations that were emerging from the research. The researcher refined data analysis every time a new deviant case came up, and this revision proceeded until the researcher could explain most of the data captured in the study. This procedure helped refine all the conclusions reached until they accounted for all the known cases without exception.

Transferability

The other key element of trustworthiness is transferability, which refers to the generalizability of inquiry (Amin et al., 2020). Data are transferable to the extent that they reflect the settings and samples other than those from which they were derived (Lincoln & Guba, 1985). For this research, the researcher established transferability by providing thick descriptions of the participants. The participants were staff members who worked in the selected school district in New Mexico and were involved in e-waste management through the help of the director for technology. By gathering data from these participants through one-on-one semistructured interviews and a focus group discussion as well as examining open records, the researcher was able to determine whether the implementation of the State of New Mexico's Manual of Procedures Public School Accounting and Budgeting Supplement 12 Capital Assets by a

Southern New Mexico School District leads to the ethical and responsible disposal of e-waste in the post-COVID19 pandemic environment.

In addition, to assist the reader in assessing the transferability of the findings in this research to other samples and settings, descriptions of the inclusion criteria for the study sample are provided in Chapter 3. All members of the recruited sample met those criteria. Besides, the researcher provided thick descriptions of the findings in the Results section of this chapter, which are in the form of direct quotations from the data. Using the participants' own words, the contexts and perspectives from which they spoke will be conveyed to the readers.

Dependability

Dependability is usually used to demonstrate or measure the reliability and consistency of the study results. Dependability refers to the extent to which the procedures in a study can be replicated in the same research context to get the same results (Lincoln & Guba, 1985). Dependability largely focuses on whether the same results would be attained if the same study is conducted twice (Morrow, 2005). For the current study, the researcher included sufficient information from the research report that could enable another researcher to replicate the study and get similar findings.

A strategy used to establish dependability in this study is inquiry audit or audit trail of the study procedures. Detailed descriptions of the study procedures have been provided in Chapter 3 to enable other researchers, if necessary, to verify the integrity of those procedures by replicating the study. An audit trail, as Nowell et al. (2017) pointed out, is a transparent description of the steps taken in a study from the beginning of the project until when the findings were reported. In this study, the researcher followed eight steps. First was determining what to research. The researcher sought to determine whether the implementation of the State of New Mexico's

Manual of Procedures Public School Accounting and Budgeting Supplement 12 Capital Assets by the Southern New Mexico School District leads to the ethical and responsible disposal of e-waste in the post-COVID19 pandemic environment.

The second step entails identifying how to research the identified problem. In this study, step two entailed examining secondary data and research including previous research reports and studies. Moreover, the researcher decided to use qualitative methods to conduct the study.. These method was best suited for exploring whether the implementation of the State of New Mexico's Manual of Procedures Public School Accounting and Budgeting Supplement 12 Capital Assets by the Southern New Mexico School District results in the ethical and responsible disposal of e-waste in the post-COVID19 pandemic environment. Data collection involved a focus group and semistructured interviews with open-ended question, in addition to open records. After establishing the topic for research and how the study would be done, the third step was about writing a research plan to provide more information concerning the timelines, research goals, dependencies, and participant characteristics.

The fourth step entailed preparing the research. The researcher identified the open records, selected the participants, scheduling interviews and focus groups, and prepared Zoom meetings and the necessary equipment at this stage. Step five entailed executing the research, which took roughly 6 months. The researcher conducted interviews with 10 participants online and a focus group discussion with three participants both via Zoom. The researcher recorded primary data using the default Zoom voice recorder and took notes with paper and pen for backup. Besides, the researcher obtained secondary data in the form of open records from the school district. The researcher maintained an audit trail of all the notes taken in the focus group

discussion and in each of the 10 interviews, which included follow-up questions in addition to the questions in the interview protocol.

The sixth step entailed coding and synthesizing the qualitative data to find insights. Thematic analysis was used to code the data with the aid of NViVo 12+ software. The researcher found themes that provided insight, which helped answer the research questions and achieve the goal of the study. In the seventh step, the researcher created a research output in a form of a report consisting of the key findings from the study. The report included an executive summary, insight into themes, and supporting evidence. The last step will be sharing the findings with key stakeholders (see Nowell et al., 2017). Important records are kept regarding what the researcher did when conducting the study. These details encompass information on how the data collection instruments such as focus group protocol and interview protocol were developed; all raw data and notes taken during the interviews and focus group, as well as the raw data from open records; trustworthiness notes relating to confirmability, dependability, credibility, and transferability; and a codebook that shows a list of all the codes that the researcher used during the data analysis process.

The above-mentioned audit trail is a description of each step the researcher took to complete this research. It spans from the design of the study to when the reporting of the findings. By following this audit trail, other researchers may get the same results. Thus, dependability was established.

Confirmability

The final aspect of trustworthiness that the researcher established in this research is confirmability. Confirmability is the degree of neutrality in the findings of a particular study (Amin et al., 2020). Confirmability shows that the findings are founded upon the responses of the

respondents and not on the researcher's personal motivations or bias (Lincoln & Guba, 1985). An audit trail highlighting every step that the researcher took during the data analysis process to justify the decisions made in this study helped establish credibility. Specifically, the researcher followed six phases during data analysis in line with the thematic analysis process described by Clarke et al. (2015). Moreover, the use of member-checking procedure contributed to confirmability because it allowed the respondents to confirm that the researcher's interpretations of the data correctly reflected their intended responses rather than any of the researcher's biases.

Results

The researcher sought to determine whether the implementation of the State of New Mexico's Manual of Procedures Public School Accounting and Budgeting Supplement 12 Capital Assets by a Southern New Mexico School District leads to the ethical and responsible disposal of e-waste in the post-COVID19 pandemic environment. The results are presented in this section in detail. In total, four themes emerged from the data. The results of the data analysis are organized by the research questions. The themes are summarized in Table 4 shown.

Table 4: *Research Questions and their Corresponding Themes*

Research Question	**Themes used to address the research question**
RQ1: How do the current Southern New Mexico School District and New Mexico Southern New MexicoState Surplus Disposal Policies promote the responsible disposal of Chromebooks, iPads, teacher laptops, modems, projects, interactive boards, and other electronic equipment that were purchased for student and teacher use during the pandemic?	Theme 1: Encourage erasure of information from each device, not throwing devices directly in dumpster, and repairing them to keep them alive for as long as possible Theme 2: Require inventory of the e-waste materials, obtaining approval to disposal, auctioning them, and disposing them with right company
RQ2: How does the implementation of the State of New Mexico's Manual of Procedures Public School Accounting and Budgeting Supplement 12 Capital Assets by a Southern New Mexico School District lead to the ethical and responsible disposal of e-waste in the post-COVID19 pandemic environment?	Theme 3: State of NM's Manual of Procedures helps school district organize proper disposal of e-waste Theme 4: School district follows a specific process for e-waste disposal based on State of NM's Manual of Procedures, which ensures proper disposal of e-waste

Research Question 1

For this study, RQ1 was as follows: How do the current Southern New Mexico School District and New Mexico State Surplus Disposal Policies promote the responsible disposal of Chromebooks, iPads, teacher laptops, modems, projects, interactive boards, and other electronic equipment that were purchased for student and teacher use during the pandemic? Two themes emerged from the data that helped to answer this question: (a) encourage erasure of information from each device, not throwing devices directly in dumpster, and repairing them to keep them alive for as long as possible and (b) require inventory of the e-waste materials, obtaining approval to disposal, auctioning them, and disposing them with right company.

Theme 1: Encourage Erasure of Information from Each Device, Not Throwing Devices Directly in Dumpster, And Repairing Them to Keep Them Alive for as Long as Possible

One open record, one focus group discussion, and most individual interviews contributed to the data supporting this theme. The finding indicated that according to the participants and as demonstrated by the open record, the current school district and state surplus disposal policies promote the responsible disposal of obsolete electronic equipment purchased for student and teacher use during the pandemic by encouraging the erasure of personal information from each device; not throwing obsolete devices directly in dumpsters or trash cans; and if possible, repairing them to keep them alive for as long as possible. An analysis of Open Record 1 revealed that the Director For Technology must certify that all district programs and personal information have been erased from all computers marked for disposal.

In the focus group (FG) discussion, FG Participant 2 spoke about removal of all personal information from the electronic equipment before they are disposed, saying, “Usually when we dispose of like computers or laptops, or anything of that nature, the technology department will

wipe the hard drive. I mean information that's on there." This participant added that the information that is erased from the hard drive is usually student information, or could be any other type of information, saying, "It's student [information] that is usually [the] information that's on there."

FG Participant 3 stated that the request for the disposal of the e-waste materials is usually approved upon request, saying,

> Most of the time, they just approve the request [for disposal]. I don't know if they ever denied anything and then we have to certify, like Mr. Costa said that the hard drives have been wiped clean, and that there is no information on those [hard drives].

Similarly, Interview Participant 2 mentioned that before they dispose e-waste items, an individual, specifically a site tech, would first erase or wipe all the data contained in them. When asked if they erase the hard drives, Interview Participant 2 responded affirmatively, saying, "Yes, sir, for each site. The site tech will format those hard drives." He added that in the past, they used to sell their old electronic equipment without wiping the hard drives but now they wipe the hard drives before the equipment are sold off to other companies with all the information in them erased, saying,

> In the past, they had us just removing the hard drives completely, and then they would sell the items as is. But more recently, they've had us completely format them, wipe the hard drives, and then insert them back and sell them. I guess that way it's sold as a full product.

Furthermore, Interview Participant 2 indicated that for 3 years they were just removing the hard drives from the computers and selling them without wiping the hard drives, but they began wiping the hard drives just 1 year ago. Specifically, when asked how long ago that they began

just wiping the drives instead of removing them from the computers, this participant mentioned, "so removing them, I would say, this is my third year as a tech, so that first year they had us obsolete. During the summer the last year is when they want us to remove and wipe the drives."

Likewise, Interview Participant 3 mentioned, "so the ones that are already outdated … so they clean them out. We can't pick up until they're clean, so they wipe them out. They take all the information." This participant added, "They have to do all that. Then they go with the serial numbers. They write the serial numbers and all that." Interview Participant 3 talked about not throwing obsolete electronic equipment in the dumpster, saying, "computers, televisions, and all that. We cannot just throw it in the dumpster." Likewise, Interview Participant 4 talked about taking out the hard drive, format it, and them put it back before they are disposed of, saying,

> We also have a new asset manager that we're transitioning in, that we're going to start scanning those computers into that asset manager. After they're scanned into that asset manager, we checked serial number, we make sure everything's taken off the computer. If it has a hard drive, we take out that hard drive, format it. put it back in after the write-up … we're trying to [wipe the] hard drive all that, clean them all out, [and] put them back in.

When asked if erasing all the hard drives is a process that takes a lot of time, this participant mentioned, "I would say it's more time-consuming cause you pull the hard drive, erase it, and then you reinstall it." He added that erasing the hard drives of older desktop computers was a more time-consuming process than erasing the hard drives of newer chromebooks and laptops, saying,

> So that's for the older desktops, any kind of older desktop computer. Now that we're actually almost done with all those, and we have nothing. But I would have to say

> nothing but laptops and chromebooks, that's mainly what we're dealing with. It's a lot faster now, because it's easier to format all those than a whole desktop where you have to set up the tower, set up a monitor, connect it, make sure everything's good to go. So that's the long, the harder part as far as that. Now we're mainly going to start getting a lot of laptop or chromebooks when we get those. The good thing about those is that once we put them into our Google Admin system, we can wipe them through there. You don't have to go in there. Once we disenroll them and factory reset them they're good to go as if they were straight out of box. It takes all our information away.

Interview Participant 6 reported,

> If the whole device is damaged, we just go through the whole process of decommissioning it. This, either by obsoleting devices, things that are not supported. We just kind of like put him into one space … We don't really throw away anything here directly. So that's kind of how we deal with it where I've been taught to deal with it.

Interview Participant 6 also talked about repairing the electronic equipment, saying,

> So, the process, I guess we'll go from like chromebooks, which is probably our biggest e-waste in the sense. We get the device, and we try to repair it as much as we can. And if it gets to a point that it is on deem on repairable. Then we use it on parts, and then we strip it like we either use parts that do work from that chromebook and put it to another chromebook, and then it gets to a point where it's just like either the shell or the part that didn't work. We have systems where we repair devices. We order parts, we keep them alive as long as we can before we have to decommission something.

Interview Participant 3 also talked about not throwing the obsolete electronic devices directly into the dumpster, saying,

> Computers, televisions, and all that, we cannot just throw it in the dumpster. We literally have to pay for a company to come and pick them up and dispose of them properly and from there was I don't know, you don't know, you don't know what happens to those after that. But supporting their permits, they know all that their license to get rid of them and all that cause we just can't throw them in the [dumpster].

This participant added,

> And the I learned that my first year I started working through some TVs in the dumpster. So the El Paso disposal came to pick up the dumpster and he saw TVs, and [said] we have to take them out. No, we cannot throw TVs and screens and computers and all that we cannot throw in, though you know, whatever doesn't sell on auction, we dispose of it properly. And you know we don't. We don't throw in, you know, trash cans or give them to people, or whatever it it's, you know I know that we're not supposed to throw nothing. You know all those things, like the new boards come in those big boards. You know how we're going to get rid of them. We just can't throw them. We can't throw them. That's rule number one. We cannot throw them in the in the, you know, in the dump, or, you know, in the in the dumpster, or make a hole in in in and bury them.

Theme 2: Require Inventory of The E-Waste Materials, Obtaining Approval for Disposition, Auctioning Them, And Disposing Them with Right Company

One open record, one focus group discussion, and most individual interviews contributed data supporting this theme. The finding showed that according to the participants and as shown by the open records, the current school district and state surplus disposal policies promote responsible disposal of obsolete electronic equipment that were purchased for student and teacher use during the pandemic by requiring inventory of the e-waste materials, obtaining

approval to disposal, auctioning these devices, and disposing them with right company. In the focus group, FG Participant 3 mentioned,

> Once the materials are collected and set aside in a specific location, and we have finance or Lourdes in our department, and she along with her girls, goes out there and takes them inventory of the items. We take the inventory of the items we prepare to list. That list will be, we will prepare an RIP Number, a big number excuse me. And we will present a packet to the board … We have to get approval from the State. As soon as we get that approval we'll make arrangements of how our calendar is to go ahead and set an online auction. And that, and like action, it all also takes around a month right to be processed. And it's all through online.

When asked whether approval for the decommissioning of the obsolete equipment must first be obtained from the State, this participant stated,

> Yes. yes, Lourdes does submit a list. So, Lourdes and her girls will go out to wherever the inventory is being held, and they'll do an inventory of what is, you know what's at the warehouse, and that list gets sent to the State. The State will then review the list, and within a 30-day period we'll go ahead. Most of the time they just approve the request. I don't know if they ever denied anything. and then we have to certify, like Mr. Costa said that the hard drives have been wiped clean, and that there is no information on those [hard drives].

Interview Participant 2 mentioned that they put the information of each e-waste item in a spreadsheet, and then allow some outside companies come and pick them up to auction them off. Specifically, this participant noted,

> We usually write them up. We put them on a spreadsheet format. Any hard drives, if

there's any available depending on the items and we we've had outside companies come in and pick them up, or we've had people from the warehouse come and pick them up, and then they sell them. They auction them off and that's my understanding of all these items, how we get rid of them.

Interview Participant 3 mentioned, “We literally have to pay for a company to come and pick them up and dispose of them properly.”

Interview Participant 1 noted that they have someone who runs the entire inventory process and then after the items are inventoried, they are delivered for auction, stating,

> I think you'd probably need to go through [personnel] in finance ... who runs the inventory process. We deliver, and then once it's there, they kind of take it from there until the auction's done, and then we step back in.

Interview Participant 10 also talked about inventorying the equipment, stating,

> They came in and inventoried and said, okay, hey, this is all the equipment on your, your campus. And then we could go in there and highlight or check mark or check off and say, okay, these 50 items are what we're sending back to you to dispose of. Here you go.

Moreover, Interview Participant 3 mentioned that they have to take all the obsolete equipment out of the inventory so that they will not be in the school’s inventory anymore, saying,

> We will put all the electronic that it's electronic. We turn in this paperwork to purchasing a little with Lourdes’s purchasing department. Well, first of all, we take them out of inventory cause, yeah, they're obsolete. We take them out of our inventory so they won't be in the school’s inventory … pick them up, pick them out of inventory and put them in storage so they can be ready for auction. And that's what we do with computers. I mean, everything that's computer 100 or more. We tag them, we inventory those things, and so

> we can have control of what we take on what school, and when we pick them up. We take them out of inventory. Keep track of all the material.

This participant added that when the inventory process is done, they obtain permission or approval from the State before those items are auctioned off, stating,

> And then we send the paperwork to technology [department] and to the emergency people so they can get that permission from the State. And once we get that approval, they start the auction process. Okay, so the auction comes and everything that didn't sell, we have to dispose [them of].

Likewise, Interview Participant 4 reported that when disposing oChromebooks, iPads, teacher laptops, modems, projectors, interactive boards and other electronic equipment, the district first inventories them, saying,

> As far as my part, my part, anytime we reached say, Chromebooks, for example, one that's at the end of life or broken that we can't use anymore, we'll inventory into an inventory sheet and then anything else is done differently. I know one of the other things they did. They did have an inventory crew come in and inventory equipment for somewhere else that did a district-wide inventory. I know that kind of helped.

Similarly, Interview Participant 9 indicated that the district disposes of Chromebooks, iPads, teacher laptops and other obsolete equipment by first inventorying them and then obtaining approval from the State before auctioning them. This participant stated,

> Well, that list is provided to me from the technology department on obsolete equipment, which would contain all of the information that you did provided. And then us and the purchasing department, what we do is we do, and we inventory the items. Okay, when we inventory those items we have to go and then we send that information to the board.

> Those items are sent to the board or board approval that will go with the resolution When I enter to them. Then we get board approval. We send the resolution with a letter to the State to the New Mexico Auditor Office. The Auditor Office will receive it. They will assign a disposition number and then we have to wait 30 days after we get that notice and then we could go ahead and proceed with the surplus auction.

The analysis of Open Record 1 showed that approval must first be obtained from the relevant authorities before disposal. Specifically, the document revealed that the *Computer, Equipment and Furniture Transfer/Turn-In Form* is submitted to the Southern New Mexico District's Technology Department, which then submits a work order for these materials to be removed from the campus and collected at a central location. The Technology Department then submits the form to the Finance Department, which physically verifies that the information submitted on the form is correct. The information is then submitted to the New Mexico State Department of Finance and Administration for review and approval for disposition. Moreover, Interview Participant 3 stated,

> Well, first of all, we take them out of inventory cause. Yeah, they're obsolete. We take them out of our inventory so they won't be in the school's inventory. And then we send the paperwork to technology and to the emergency people so they can get that permission from the State. And once we get that approval, they start the auction process.

Interview Participant 8 spoke about disposing the e-waste equipment with the right company, stating,

> And then efr, or whoever is supposed to be organizing the disposal of these items. They go through the whole process of [selecting a company for disposal] and make sure that they have the right company. All the procedures are followed before anything happens.

Research Question 2

For this study, RQ2 was as follows: How does the implementation of the State of New Mexico's Manual of Procedures Public School Accounting and Budgeting Supplement 12 Capital Assets by a Southern New Mexico School District lead to the ethical and responsible disposal of e-waste in the post-COVID19 pandemic environment? Two themes arose from the data that helped to address this question, which are as follows: (a) State of NM's Manual of Procedures helps school district organize proper disposal of e-waste and (b) school district follows a specific process for e-waste disposal based on State of NM's Manual of Procedures, which ensures proper disposal of e-waste.

Theme 3: State of NM's Manual of Procedures Helps School District Organize Proper Disposal of E-Waste

One focus group discussion and some individual interviews contributed data supporting this theme. The finding revealed that according to the participants, the implementation of the State of New Mexico's Manual of Procedures Public School Accounting and Budgeting Supplement 12 Capital Assets by a Sothern New Mexico School District leads to the ethical and responsible disposal of e-waste in the post-COVID19 pandemic environment as the manual helps the school district ensure proper disposal of e-waste.

Interview Participant 3 spoke about the process being effective, saying, "So it's effective in organizing this process as PSAP manual, that the process that even though it's long drawn out, it works. Yeah, it's working for us." This participant added that they observe specific steps based on the manual and they have not come across any issues, highlighting the effectiveness of the process in leading to ethical and responsible disposal of e-waste in the post-COVID-19 period. This participant stated,

> We have our steps, and we're taking those steps. And so now, since we working I haven't heard, you know that we're doing something wrong, or you know that we, we're not supposed to do this or that, like, I said. My duty is to pick them up and get them ready for auction. Get them, our inventory is enough to paperwork.

Furthermore, when asked if they feel that the manual is effective in helping them and the school district dispose of e-waste, Interview Participant 9 was affirmative, saying, "Yes, yes, it is [effective]."

Additionally, Interview Participant 1 mentioned that the manual is effective in helping organize the disposal of the e-waste products. Specifically, when asked if he thinks the State of NM's manual of procedures helps the school district organize proper disposal of e-waste, this participant responded affirmatively, stating, "I think so." He added,

> I think it's kind of a starter, if that makes sense. I mean, it's a good starting point. I do think that just in the personal experience that I've had with the process as far as submittal of inventory to the state and then the state signing off ... And that whole process to be able to get to the auction is so time-consuming, and it takes forever. And it's one of those things that I do think that we could benefit from. And it's funny, right, because here we are talking about e-waste. But a software program that would kind of encapsulate everything all in one shot. You've got (a southern New Mexico School District), independent school district, and your inventories are joined at the hip with the state inventory list, right? And all you simply do is go down the list after you confirm that it's there. And boom, it's there. All right, we're sending it to the auction. We can go ahead and promote that and get it done in a more timely manner.

Furthermore, the participants indicated that the district effectively implements the state's

manual of procedures to ensure proper disposal of e-waste, with Interview Participant 8 stating, "I think they [the district] do a pretty good job."

Interview Participant 9 mentioned that the school district does have a standard protocol that they use to facilitate the inventory process that they have to go through. The protocol helps prepare the obsolete equipment and how they will be stored and sent to the main location. This participant stated,

> Yes [they have a standard protocol], the schools will go ahead and guess do guess the disposition. They fill out a disposition form. They send that to physical plant and physical plant will do a work order, pick up that information. So yes, and there is a process.

Interview Participant 7 stated that the district is making an effort to implement the New Mexico State Manual of Procedures, stating, "they're trying to follow it, since, you know, it does take so long to dispose of the equipment."

Likewise, Interview Participant 8 also mentioned that the district implemented the State of New Mexico's manual of procedures rather well, saying, "I think they do a pretty good job." These findings seem to suggest that according to the participants, the State of New Mexico's manual of procedures helps the school district to effectively organize proper disposal of e-waste items, which in turn leads to ethical and responsible disposal of e-waste in the post-COVID19 pandemic environment.

Theme 4: School District Follows a Specific Process for E-Waste Disposal Based on State of NM's Manual of Procedures, Which Ensures Proper Disposal of E-Waste

One open record, one focus group discussion, and a few individual interviews contributed data supporting this theme. The finding indicated that according to the participants, the implementation of the State of New Mexico's Manual of Procedures Public School Accounting

and Budgeting Supplement 12 Capital Assets by a Southern New Mexico School District leads to the ethical and responsible disposal of e-waste in the post-COVID19 pandemic environment since the school district follows a specific process for e-waste disposal based on State of NM's Manual of Procedures, which ensures proper disposal of e-waste.

Interview Participant 4 talked about the process followed by the district for the disposal of e-waste based on the state's manual of procedures, stating, "Nothing has changed. It's the same process of write it up the equip, write up the equipment, scan it is, send it in, and they pick it up." This viewpoint shows that the school district is following the same procedure for the disposal of e-waste to ensure proper disposal.

According to Interview Participant 8, "all the procedures are followed before anything happens."Similarly Interview Participant 9 indicated, "there's a process and everybody working on that." Interview Participant 7 talked about the district following the e-waste disposal process based on the state's manual of procedures, stating, "I would just follow pretty much the procedures that they tell us to follow here at the district. And I'm assuming they're following whatever New Mexico PED is mandating." When asked how well he thinks the school district implements a New Mexico State Manual of Procedures for the purpose of ensuring the proper disposal of e-waste that consists of obsolete and old electronic equipment, this participant indicated that they are trying to follow the manual, stating,

> I would think they're trying to follow it, since, you know, it does take so long to dispose of the equipment. It's not like, we're just throwing it into a dumpster or anything like that ... And [if] it doesn't get sold it's still there.

In the focus group, FG Participant 1 spoke about following a particular process for the disposal of e-waste based on the state of New Mexico's manual of procedures, stating that they have an

inventory process that facilitates decommissioning of e-waste items at whatever site or sites, which are then stored in a certain location.

Additionally, in the interviews, Interview Participant 4 mentioned that the school district follows a State manual and described the manual as one that outlines the way that all surplus property should be disposed of by State entities such as schools and government offices, stating, "It's the State manual that that delineates the disposal of all surplus property by State entities, schools, government offices, etc." This participant added that their school district follows it, saying, "And so the district follows the procedures on that."

Similarly, Interview Participant 6 noted that their school district also follows a particular process for the disposal of e-waste based on the State of New Mexico's manual of procedures. Specifically, this participant indicated that they follow,

> The proper ways of disposing batteries, the proper way of disposing certain components of computers that are hazardous to the environment. And I know that well, that we don't really throw away lot of things. [They] go to warehouse and … from them I assume they either dispose of it properly.

Moreover, Interview Participant 9 indicated that they follow the State of New Mexico's manual of procedures to ensure that all e-waste items from the district are disposed of in the right manner, saying, "Well, that's [State of New Mexico manual of procedures] the procedure that we're following now to dispose district assets."

Interview Participant 3 also mentioned a particular process that they follow for appropriate disposal of all obsolete e-waste items, and the process is based upon the State of New Mexico's manual of procedures. This participant described the whole process, stating,

> So the ones that are already outdated? Okay, so they clean them out. We cannot pick up

> until they're clean, so they wipe them out. They take all the information, and they have to do all that. Then they go with the seal numbers. They write the seal numbers and all that, and then they get the approval from the principal, assistant principal or their supervisor that they're gonna get rid of them. We have a form. It's a turn in form and then they send it to warehouse with the work order.

He added,

> Okay, we cannot pick up. Not unless he has that principals' signature. Once it has that signature ... then we go with the work order. We send our driver with pallets and all that, and we start. We can't do one by one. I'm not gonna allow that we do. One by one. It will take us a month to do one school, and so what we do is like randomly get to numbers and tech numbers, and they have to match the list and all that. So you know, you know, we stop. And we said, 2, 3 for 5. Yes, we're doing. We're getting the correct ones, we bring them back to the warehouse. We stack them correctly, we shrink, wrap them, and we take them to the district's storage facility. We have a building there to put them on auction, for auction, and then they do all that paperwork and all that with the State, so to see whether they give us the okay. I think it's it takes about 3 months or 6 months, something like that to get the approval.

Interview Participant 3 continued to describe the process, saying,

> And once we get that approval, they start the auction process. Okay, so the auction comes and everything that didn't sell, we have to dispose, you know, whatever doesn't sell on auction, we we dispose of it properly, you know, from when we pick up. So we take them to auction, and from there, and I just wait for the action company to come and pick up.

This participant also noted that he is comfortable that the State of New Mexico's Manual of

Procedures is being implemented in an effective fashion by the school district. When asked if the district implements the State of New Mexico's Manual of Procedures in a manner that ensures proper disposal of waste, this participant responded affirmatively, stating, "Yes, I think cause we're not throwing them in the trash, like I said. You know."

Summary

The problem addressed in this study was that it was not known whether the implementation of the State of New Mexico's Manual of Procedures for Public School Accounting and Budgeting Supplement 12 Capital Assets by a Southern New Mexico School District leads to the ethical and responsible disposal of e-waste in the post-COVID-19 pandemic environment. The purpose of this study was to determine whether the implementation of the State of New Mexico's Manual of Procedures Public School Accounting and Budgeting Supplement 12 Capital Assets by a Southern New Mexico School District leads to the ethical and responsible disposal of e-waste in the post-COVID19 pandemic environment. Two research questions guided this study, which have been answered adequately. The researcher collected and analyzed interview data and focused group data from staff members who were involved in e-waste management in the selected School District and open records from the District through thematic analysis. The researcher followed six steps of analysis, namely, familiarization with the data, generating initial codes, searching for themes, reviewing themes, defining and naming themes, and finally reporting. NVivo 12 software aided in the analysis process.

RQ1 was "How do the current Southern New Mexico School District and New Mexico State Surplus Disposal Policies promote the responsible disposal of Chromebooks, iPads, teacher laptops, modems, projects, interactive boards, and other electronic equipment that were

purchased for student and teacher use during the pandemic?" The findings revealed that according to the participants and as demonstrated by analysis of the open records, the policies promote responsible disposal of the obsolete electronic devices by encouraging erasure of personal information from each device; not throwing obsolete devices directly in dumpsters; and if possible, repairing the devices to keep them alive for as long as possible, which was the first theme. Furthermore, the policies promote responsible disposal by requiring inventory of the e-waste materials, obtaining approval to disposal, auctioning the devices, and disposing them with the right company, which was the second theme.

RQ2 was "How does the implementation of the State of New Mexico's Manual of Procedures Public School Accounting and Budgeting Supplement 12 Capital Assets by a Southern New Mexico School District lead to the ethical and responsible disposal of e-waste in the post-COVID19 pandemic environment?" The answer was that the implementation leads to the ethical and responsible disposal of e-waste in the post-COVID-19 pandemic environment because the State of New Mexico's Manual of Procedures helps school districts organize proper disposal of e-waste, which was the third theme. Besides, the findings demonstrated that the school district follows a specific process for e-waste disposal based on State of NM's Manual of Procedures, ensuring proper disposal of e-waste, which was the fourth theme. Chapter 5 contains the research summary, implications, conclusions, and recommendations of the whole study based on these findings.

Chapter 5: Interpretation, Implications, and Conclusion

The aim of this study was to investigate the impact of the State of New Mexico's Manual of Procedures Public School Accounting and Budgeting Supplement 12 Capital Assets, especially its application by a Southern New Mexico School District to foster ethical and responsible e-waste disposal in the post-COVID-19 pandemic environment. This problem addressed in this investigation was the gap in knowledge concerning whether these guidelines and their enactment by the school district effectively addressed the burgeoning challenge of e-waste disposal. The pandemic has precipitated a notable surge in electronic device usage within educational settings, elevating concerns about their disposal (Kurniawan et al., 2022). Before the pandemic, schools generated an estimated 4 million tons of e-waste, a figure is now more likely higher due to increased digital adoption during the pandemic (Trivedi et al., 2022).

The study's methodology encompassed the in-depth examination of data from 13 participants affiliated with a Southern New Mexico School District. Using NViVo 12+ and the inductive thematic method proposed by Clarke et al. (2015), the researcher meticulously analyzed the data gathered from 10 individual interviews, a focus group discussion, and pertinent documents. This methodological approach facilitated a comprehensive exploration of the themes and insights to answer the study's research questions. Two research questions guided this study:

RQ1. How do the current Southern New Mexico School District and New Mexico State Surplus Disposal Policies promote the responsible disposal of Chromebooks, iPads, teacher laptops, modems, projects, interactive boards, and other electronic equipment that were purchased for student and teacher use during the pandemic?

RQ2. How does the implementation of the State of New Mexico's Manual of Procedures Public School Accounting and Budgeting Supplement 12 Capital Assets by a Southern

New Mexico School District lead to the ethical and responsible disposal of e-waste in the post-COVID19 pandemic environment?

The findings from these inquiries are critical for understanding the efficacy of the policies and practices in place. Two significant themes emerged that addressed RQ1. The first theme encompassed encouraging practices such as the erasure of data from devices, avoiding immediate disposal into dumpsters, and undertaking repairs to prolong the lifespan of the devices. The second theme highlighted the necessity for a thorough inventory of e-waste materials, obtaining approvals for disposal, auctioning the items, and ensuring their disposal through appropriate companies. This finding indicates a need for a multifaceted approach to e-waste management within the school district, underscoring responsible disposal and sustainability.

In response to RQ2, two additional themes emerged. The first theme indicated that the State of New Mexico's Manual of Procedures assists the school district in organizing proper disposal of e-waste. The second theme illuminated the specific process followed by the school district for e-waste disposal, as outlined in the State of New Mexico's Manual of Procedures, ensuring proper and ethical disposal practices. These findings collectively provide a nuanced understanding of the district's approach to managing e-waste in a responsible manner, reflecting the broader implications of policy and practice in the realm of environmental sustainability in the educational sector.

Interpretation of the Findings

Comparative Analysis with Peer-Reviewed Literature

The exploration of e-waste management in the context of COVID-19 pandemic in the current study aligns significantly with existing literature. Apostol et al. (2022) emphasized the

importance of comprehensive waste management policies during the pandemic, a perspective that resonates with the focus of this study on responsible disposal policies of electronic equipment in educational settings. Furthermore, the research corroborates the findings of Baldé and Kuehr (2021) who noted the considerable impact of the pandemic on e-waste generation. This study extends these observations by focusing on the effectiveness of specific policies, such as those implemented by the State of New Mexico and the selected Southern New Mexico School District, in managing the resultant e-waste responsibly.

The surge in the use of electronic devices within education systems, as observed by Clark et al. (2021) and Xue et al. (2022), mirrors the context of the present study, which was the disposal of these devices after use. The current study adds to the discourse, as it includes a detailed examination of how educational institutions, under the guidance of state and district policies, are managing the disposal and recycling of electronic devices. This approach not only aligns with the observations by Adejumo and Oluduro (2021) about the pandemic's implications on e-waste management, but it also highlights practical policy implementations aimed at addressing these challenges.

The intersection of e-waste generation, collection, and recycling as investigated by Dias et al. (2022) and Adnan et al. (2022) has a strong connection with the findings of the current study. The current study's insights into the policies and practices of e-waste disposal within educational institutions serve as a practical example of addressing the gap in e-waste management highlighted in the aforementioned studies. The current study showed how policy and regulatory frameworks can guide effective management of e-waste, ensuring responsible recycling and disposal processes.

Lastly, the role of stakeholder involvement in e-waste management, as explored by Sharma and Prince (2022) and Alabanza et al. (2022), is a significant aspect that this study addressed. By examining the implementation of e-waste policies in the selected Southern New Mexico School District, the study underscored the importance of inclusive stakeholder participation in the e-waste management process, especially during the COVID-19 pandemic. This finding not only supports the findings in the existing literature but also offers a concrete example of effective stakeholder engagement in managing the challenges of e-waste disposal in educational settings.

Analysis and Interpretation Within Theoretical Framework

The study's findings, interpreted through the lens of the sustainability theory (Childers et al., 2014; Redclift, 2005), emphasize the critical balance among environmental, social equity, and economic demands in the context of e-waste management. This theory suggests that achieving sustainability in e-waste management necessitates strategic and sensitive designs that integrate these three pillars. The themes that emerged from the study—encouraging data erasure, inventory management, and responsible disposal practices—reflect a commitment to this balance. For instance, the emphasis on erasing data and repairing devices to prolong their life cycle aligns with the environmental aspect of sustainability, minimizing waste and reducing environmental impact.

In relation to existing literature, these findings both corroborate and extend the current understanding of e-waste management in the educational sector, particularly during the COVID-19 pandemic. Studies by Clark et al. (2021) and Xue et al. (2022) highlighted the increased reliance on electronic devices in education, thereby implicitly raising the importance of effective e-waste management strategies. The current study’s findings yielded practical insights into how

such strategies can be being implemented, echoing the need for policy amendments as Negrete-Cardoso et al. (2022) recommended. Moreover, the research aligns with Rashed et al. (2021) in identifying the challenges and adaptations required in the e-waste management sector, emphasizing the need for a holistic approach as postulated in sustainability theory.

Furthermore, the study's findings highlighted the critical role of stakeholder involvement in effective e-waste management, as supported by Sharma and Prince (2022) and Alabanza et al. (2022). This aspect underscores the social equity pillar of the sustainability framework, emphasizing the importance of inclusive and collaborative approaches. The study revealed how various stakeholders, from policy-makers to end-users, play pivotal roles in shaping effective e-waste management practices, thus mirroring the inclusive stakeholder model suggested in the literature.

The critical analysis of these themes within the sustainability framework also revealed certain divergences from existing literature. Although the literature underscores the importance of a circular economy and comprehensive waste management strategies (Dias et al., 2022; Gollakota et al., 2020), the study highlighted specific, context-driven challenges and adaptations in the school district's approach. This difference points to the unique complexities and localized responses within the broader spectrum of global e-waste management practices.

In summary, the interpretation of this study within the sustainability theoretical framework not only confirms but also enriches the existing literature on e-waste management. The study contributes to a nuanced understanding of the practical applications and challenges of sustainable e-waste management strategies in educational institutions. Such understanding is important, particularly in the context of the unprecedented increase in electronic device usage during the COVID-19 pandemic.

Limitations of the Study

The limitations of this research related to the study's methodology and execution, impacting its trustworthiness. A primary limitation was the potential for researcher bias, as noted by Given (2008). This bias could have influenced interpretations of data collected from the Southern New Mexico School District, particularly regarding the motivations and actions of entities purchasing electronics at auction.

Another limitation related to the study's sample size and composition. The research sample encompassed 13 participants from the Southern New Mexico School District; thus, it may not fully represent the diverse range of perspectives and experiences in e-waste management across different districts or states. Although the sample yielded in-depth insights specific to the district, these findings might not be generalizable to other contexts or regions. This limitation affected the study's external validity, as the results might not be applicable to broader settings beyond the studied district, as highlighted by Marshall and Rossman (2016).

Regarding the study's internal validity, the reliance on self-reported data presents a potential limitation. Participants' responses could have been influenced by their perceptions, memories, or desires to present themselves and their organization in a favorable light. Although the researcher employed member checking to validate the data (see Morrow, 2005), the subjective nature of self-reporting could still lead to inaccuracies or biases in the data, affecting the credibility of the findings.

Finally, the study's timing and context, amidst the COVID-19 pandemic, may have influenced the results. The pandemic brought unprecedented changes to educational institutions and their e-waste management practices, as observed by Baldé and Kuehr (2021). These extraordinary circumstances could have affected participants' experiences and responses, thus

limiting the transferability of the study's findings to nonpandemic contexts. The pandemic's impact on e-waste management practices might differ significantly from standard practices, limiting the study's applicability in understanding e-waste management under normal circumstances.

Discussion

Technology is ubiquitous. All of the electronics that are in use have a designed end of life cycle. This is due to the rapidly changing capacity and speed of the microprocessors. Moore's Law is the prediction that the number of transistors that fit in one chip doubles each year (Our World in Data, 2023). Consequently, the technology industry constantly upgrades systems and electronic devices. Eventually devices and systems are not able to handle the additional system upgrades, thus leadimg to the purchase of new electronic devices. For example, according to USA Today, the average lifespan of a cell phone is about 2.5 years. When you consider the endless stream of devices that we consume, it becomes glaringly evident that there will be enormous amounts of e-wate generated by this process.

Lets examine the issue of technology in schools. Is technology really necessary to teach effectively? The answer is no. However, society demands that students have the knowledge and skills to use technology tools effectively, particularly when they enter the workforce. The responsibility falls on the K-12 educational system to integrate instructional technology. A failure by any school district to prepare it's students to use the technology tools effectively handicaps students when they graduate from high school. The COVID 19 pandemic which led to the closure of schools and the implementation of online instruction has lead to the massive investments in all of the devices that are necessary to accomplish this mission. We should be concerned about what happens to all of these devices when they reach their end of life.

The Sustainbility Theory integrates social, environmental, and economic responses to achieve sustainable relations (Redclift., 2005). Further, the theory holds that sustainability requires the reconciliation of the three pillars, which comprise environmental, social equity, and economic demands (Childers et al., 2014). Another chief proposition of the theory is that to achieve a balance between the economy, ecology, and society, it is necessary to have strategic and sensitive sustainable designs (Childers et al., 2014). Any proposed solutions will reverberate across the three pillars.

The following is a list of proposed solutions based on the research and personal experiences.

1. The development and implementation of e-waste policies that are aligned across national, state, local levels.There is a need for innovative leadership at all levels to make this happen.
2. Develoment of the infrastructure needed to collect, process and recycle e-waste.
3. Product stewardship calls on those in the product life cycle—manufacturers, retailers, users, and disposers—to share responsibility for reducing the environmental impacts of products.
4. Environmental Stewardship by
    a. preventing e-waste from entering municipal incinerators or landfills;
    b. preventing the export of e-waste to developing countries;
    c. providing visible tracking of e-waste throughout the product recycling chain.
5. Mining e-waste to recover metals such as copper, silver, gold, palladium, nickel, aluminum, platinum, and steel. The resources that are used in manufacturing electronics are finite and need to be recoverd

There is a national and international need to develop policies, public awareness, and actionable steps to address the e-waste issue.

Recommendations

Based on the findings and literature reviewed, the researcher offers several recommendations for future research in the field of e-waste management, particularly in educational settings post-COVID-19. First, future researchers should explore the scalability of e-waste management practices identified in this study, such as the procedures outlined in the State of New Mexico's Manual of Procedures. Research could be extended to different geographical locations and educational systems to compare and contrast e-waste management strategies. Additionally, future research could focus on the long-term effectiveness of these procedures, as suggested by Adejumo and Oluduro (2021) regarding the challenges faced by institutions in refurbishing and disposing of electronic gadgets post-pandemic.

Second, considering the current study's limited sample diversity, future research should include a broader participant base. This sample could consist of stakeholders from various school districts and states, offering a more comprehensive understanding of e-waste management across different regulatory environments. Researchers could also examine the perspectives of the end-users of these disposed electronics, as their experiences and challenges in handling second-hand electronic devices are vital for developing a full-circle understanding of e-waste management effectiveness.

Third, the study's alignment with sustainability theory suggests an opportunity for research that integrates economic, environmental, and social aspects of e-waste management. Future researchers could employ quantitative methods to measure the impact of e-waste management practices on environmental sustainability and economic efficiency. The findings

would complement the qualitative insights from the current study and result in a more holistic understanding of the effectiveness of e-waste management strategies in meeting the sustainability goals outlined by Redclift (2005) and Childers et al. (2014).

Lastly, given the rapid evolution of technology and its implications for e-waste generation, ongoing research is recommended to stay abreast of emerging trends and challenges in e-waste management. Such exploration could focus on innovative recycling and disposal technologies and the development of new policies and procedures that can adapt to the changing landscape of e-waste. Future researchers could also investigate the role of public awareness and education in enhancing responsible e-waste disposal, as highlighted by Sharma and Prince (2022) in their study on inclusive stakeholder models for e-waste management.

Implications

The implications of this study are multifaceted, impacting various levels of society from individual to policy-making. At the individual level, the study's findings emphasize the importance of responsible e-waste disposal practices. By highlighting effective disposal policies, such as those in a Southern New Mexico School District, individuals can be encouraged to participate in sustainable e-waste management, which can have a positive impact on environmental conservation.

At the family and community levels, the study underscores the significance of collective responsibility in e-waste management. The practices adopted by educational institutions, as examined in this study, can be extended to households, promoting a culture of sustainability. Such practices include proper disposal of electronics, understanding the importance of recycling, and considering the environmental impact of e-waste. By engaging families and communities in

these practices, a more comprehensive approach to e-waste management can be developed, contributing to a healthier environment.

For organizations, particularly educational institutions, this study can be used as a model for implementing effective e-waste disposal policies. The State of New Mexico's Manual of Procedures serves as a blueprint for other districts and states to develop or refine their e-waste management strategies. By adopting such guidelines, organizations can not only comply with regulatory requirements but also contribute to environmental sustainability and corporate social responsibility.

At the societal and policy level, the study's findings support the integration of robust e-waste management policies into public education systems. Policymakers can draw from the successful implementation of the State of New Mexico's Manual of Procedures to formulate policies that ensure ethical and responsible disposal of e-waste nationwide. This action can lead to a reduction in environmental pollution and promote sustainable practices in e-waste management.

Methodologically, the current study contributes to the field of qualitative research through the comprehensive analysis of e-waste management in an educational setting. The use of a case study approach offers a detailed understanding of the subject, setting a precedent for future research methodologies in similar areas. This approach can be replicated in other contexts to gather in-depth insights into e-waste management practices.

Theoretically, the current study aligns with and extends the sustainability theory. The findings indicate how environmental, social, and economic factors can be integrated to achieve sustainable e-waste management, contributing to the body of knowledge on sustainability, particularly in the context of post-pandemic e-waste challenges. The findings suggest that

sustainability theory can effectively guide policy and practice in managing the environmental impact of technological advancements in education.

In practice, the study includes actionable recommendations for educational institutions and policymakers. The findings highlight the need for continuous evaluation and adaptation of e-waste management policies to respond to evolving technological and environmental challenges. The study also highlights the importance of stakeholder involvement, from policymakers to end-users, in developing effective e-waste disposal strategies.

In conclusion, the implications of the current study are broad, affecting various sectors and levels of society. The study contains valuable insights for individuals, communities, organizations, and policymakers to enhance e-waste management practices. Adopting these practices will contribute to environmental sustainability and ensure alignment with global efforts to mitigate the ecological impacts of technological waste.

Conclusion

This study centered on evaluating the effectiveness of the State of New Mexico's Manual of Procedures Public School Accounting and Budgeting Supplement 12 Capital Assets, specifically its implementation by a Southern New Mexico School District, toward ensuring ethical and responsible disposal of e-waste in the post-COVID-19 environment. The study was anchored in the sustainability theory, which served as a robust framework for understanding how environmental, economic, and social aspects intertwine in the realm of e-waste management. By examining the practices of the a Southern New Mexico School District and the stipulations of the State Manual, the study revealed practical approaches to e-waste disposal that can be emulated or further refined by other school districts and organizations.

The findings of this study have significant implications for the field of e-waste management, especially in the context of educational institutions. The study's findings indicated that the procedures outlined in the State of New Mexico's Manual, when properly implemented, lead to responsible e-waste disposal. Key themes emerged, such as the encouragement of erasure of information from devices, avoiding direct disposal in dumpsters, and extending the lifespan of devices through repair. These findings not only reinforce the importance of responsible e-waste management practices but can also be used by other districts and states in developing or revising their e-waste management policies. By highlighting the successful application of these practices, the study contributes to the broader discourse on sustainability and responsible waste management, offering a model that aligns with the principles of environmental stewardship, social responsibility, and economic feasibility. The completion of this study marks a step forward in the understanding of e-waste management in educational settings, providing a foundation for continued exploration and improvement in this critical field.

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Appendix A: Focus Group Protocol

1. Tell me about how you dispose of Chromebooks, iPads, teacher laptops, modems, projects, interactive boards, and other electronic equipment that were purchased for student and teacher use during the pandemic.
2. How were the State Surplus Disposal Policies implemented in your school district?
3. How was the State of New Mexico's Manual of Procedures PSAB Supplement 12 Capital Assets implemented in your school district?
4. What suggestions do you have in terms of how e-waste should be handled?
5. What are the challenges in e-waste disposal that you have experienced?
6. How do you think could the challenges be resolved?

Appendix B: Semi-Structured Interview Questions

1. Describe how your district disposes of Chromebooks, iPads, teacher laptops, modems, projectors, interactive boards, and other electronic equipment (e-waste)?
   Probe: How effective is this method of disposal?

2. How did the COVID-19 Pandemic affect the way your district disposes of e-waste products?
   Probe: Has your district implemented new strategies to address e-waste disposal during the pandemic?

3. How would describe the State of New Mexico's Manual of Procedures PSAB Supplement 12 Capital Assets?
   Probe: How effective is this manual in helping organizations dispose of e-waste?

4. How well does your district implement the State of New Mexico's Manual of Procedures PSAB Supplement 12 Capital Assets to ensure proper disposal of e-waste?
   Probe: Which challenges does the district face in implementing the manual?

5. If you were mandated to ensure proper disposal of electronic devices in your district, what would you do differently?
   Probe: How different will this approach be in comparison to the existing e-waste disposal strategy?

6. If you were involved in updating and improving the State of New Mexico's Manual of Procedures PSAB Supplement 12 Capital Assets, what would you include in the manual?
   Probe: What would you remove from the manual?

Vita

Hector S. Girón, born in Ciudad Juarez, Mexico and raised in Southern New Mexico, received his B.A. in History from The University of New Mexico in 1980. He also received and M.A. in Educational Administration from New Mexico State University in 1988. He re-enrolled in the doctoral program at The University of Texas at El Paso in August of 2022.

He is a 39-year veteran in the field of education. He retired in 2022. His experience ranges from the high school social studies classroom to Assistant Principalships at both the secondary and elementary levels. He has served as an Elementary and Secondary School Principal. He served as the Director for Bilingual Education, English as a Second Language, and Language Other Than English. He served as the College and Readiness and Dual Credit Coordinator for three high schools.

During his career he has been recognized as the Texas Computer Educators Association Administrator of the Year 1999-2000, was a nominee for the National Distinguished Principal by the Texas Elementary Principals and Supervisors Association in 2003 and as the University of Texas at El Paso's Bilingual Educators Emphasizing and Mastering Standards Conference Administrator of the Year 2007. In 2013 he was recognized for his leadership and service in the Lions Club International organization by being awarded the Governor C. B. Beyer Award and becoming part of the New Mexico Lions Hall of Fame.

He has served as a member of various committees. The BEEMS Conference Advisory Council from 1999-2015, the State of Texas's Educational Technology Advisory Committee from 2004-06 which developed the Long-Range Plan for Technology for the State of Texas 2006-20, The Agenda for Education in a Democracy Scholars sponsored by the Goodlad Institute for Educational Inquiry 2006-2010, and the State of New Mexico's Biliteracy Taskforce 2014-15.

His major areas of interest are systems thinking, organizational learning and change, computer adaptive assessment and instruction, innovations in the integration of technology in

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