

Managing Electronic Waste at College of the Rockies

Andrew J. Macdonald

College of the Rockies

MGMT 490: Project Evaluation and Presentation

Greg McCallum

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Final Research Report

The purpose of this research project is to determine how electronic waste (e-waste) is handled at College of the Rockies and what can be done to sustainably recycle, repurpose or dispose of it. This research project report will describe the research, provide a literature review of past studies, and detail the research methods used to answer the research question, present the findings, discuss the findings, and provide recommendations.

Client

The business partnering with the researcher is College of the Rockies. Between the Sustainability Committee and the IT department there has been quite a bit of interest in the chosen topic. The Sustainability Committee and the IT department have agreed to help facilitate possible surveys or other means of gathering information. They have agreed to interviews about prior policies and practices the college has in place and wish to know the results to help the college with possible cost savings and improving sustainability practices for the betterment of the college community. Both of these partners will be receiving updates as the research is conducted and will be presented with recommendations that are developed. They will be the main beneficiaries of this project, and the proposals and information will be most useful to them and their respective departments.

IT Department

The IT department is the major partner of this project. They are getting the most out of this research as it pertains to their department. This research project is going to have two main contacts in the department. The first is Rene Pelletier, Chief Information Officer, and the second is Kyle Brown, IT Manager. They have agreed to provide assistance where possible and

have a strong desire to see the results of the project. Both have an interest in learning more about the topic and seeing what the college can do in this area of sustainability.

Sustainability Committee

The other main partner is the Sustainability Committee of College of the Rockies lead by Committee Chair- Becky Pelkonen. They have interest in the sustainability portion of the research and wish to know what the college can do to further its sustainability in regard to the topic. They have agreed to help facilitate surveys and other research methods with the student body and staff. For this contribution they wish to have the research presented to them and told of any recommendations and changes that could help the college be more sustainable.

The Chosen Topic

The topic that has been chosen for this research project is e-waste and the options the college has to dispose of it and what it can do for the students as well as the community. This research will deal with what the college has done previously with the e-waste it has disposed of for upgrades. Issues to address include: what is done with old computers, are they returned to the company they were purchased from, recycled, or thrown away. What is done with wiring in the walls that have been replaced to wire new devices or provide power to a new room. The old laptops that were available to students were changed to a newer model fairly recently what were the steps taken to get the new models and replace the old ones. It will also look at what the college can do to help the students dispose of e-waste properly. Recommendations could include providing instructors and students with information on how to deal with e-waste or providing a supplemental class for students to teach about e-waste. These are all options that

will be discussed in the research and to be determined if they are viable. The research question is “What can College of the Rockies do to be more sustainable in regard to e-waste”

Why This Topic

This topic is a constant issue in the world. The technology that exists today is always growing and evolving, leaving it necessary to dispose of the older technology. The waste produced by this can create major environmental problems due to chemicals used in production or it can be valuable resources that can be used rather than going to landfills. Colleges can be a major source of e-waste as they need to keep up with computers for staff and students to use. They also need to have good quality cameras and projectors for online and in-person classes, so a large amount of e-waste is produced. College of the Rockies is interested in increasing their sustainability and keeping up with their commitment to the United Nations Sustainable Development Goals, so this is a necessary topic for them to look into.

Objectives

The objective of the research is to study what the college is currently doing and learn from what other similar organizations and businesses are doing. This research looks to get an opinion from the students about what they are willing to do and what they want the college to do. This should allow the researcher to make informed suggestions for the college to look at. This could be updates to the colleges current policies and programs or new policies and programs that can be implemented in the future. The desire of this research project is to put a spotlight on e-waste and improve sustainability for the betterment of the college.

Benefits

There are a few possible benefits to come out of this project for the college and the community. Educating students and staff on the impact of e-waste can be beneficial to the College of the Rockies community. The more staff and students know can help them decide on the best course of action. Learning what other colleges do for education on the topic of e-waste can inform College of the Rockies possible ways to implement education practices. Creating ease of access to the locations of recycling centers will help the overall community. Another benefit is the impact on sustainability and environment. The less e-waste going into landfills and improperly disposed of means a better environmental footprint. Reducing e-waste would lessen greenhouse gases and other harmful effects on the environment, helping the college's environmental sustainability goals.

LITERATURE REVIEW

The research project looks to help College of the Rockies make future decisions in regard to the e-waste problem. Whether it be to start new programs for recycling or change policies to help sustainability. With help from the IT department and the Sustainability Committee the research project will generate this information and compile it into usable data for people to use. Hopefully it will have a beneficial impact on the issue of e-waste.

What is E-waste

The definition of e-waste according to the Oxford Dictionary is "Discarded electronic and electrical equipment (esp. devices such as mobile phones, computers, etc.), typically containing environmentally hazardous substances and requiring special treatment for safe disposal or recycling" (Oxford University Press, 2023). Electronics considered e-waste are objects like laptops,

televisions, computers, phones and other electrical devices. These products get broken or become obsolete over time leading to people disposing of them. This waste can be thrown into the garbage or taken to a recycling center. As these devices are disposed of they break down into different chemicals and substances. If left in a landfill, they will break down over many years slowly leaking things like lead into the local environment. If heated up by hot climate or the chemical reactions of the waste around it can cause chemicals to seep into the air.

Armughan, M., & Zafar, S. (2024) discuss how elements like lead, cadmium and beryllium, pollute the local air and possibly dissolve into the water. This creates the possibility of water poisoning local fauna and communities. This is why disposing of e-waste correctly is such a major concern.

How Much

E-waste is an extremely fast-growing problem. With people disposing of things like phones on a yearly basis the amount of e-waste grows substantially. It has been estimated that up to the year of 2021 “57.4 million tonnes” (Khattak, 2025) of e-waste has been created. This number is increasing year by year by “roughly 2Mt per year” (Khattak, 2025). This is total e-waste but of that total “only 17.4%” (Khattak, 2025) of e-waste has been properly collected and disposed of. That is an incredibly low amount of e-waste. This also shows how important developing programs to dispose of e-waste properly truly is.

Disposal

Disposing of e-waste is done in a variety of ways. The main method companies use to dispose of e-waste is to dump it into landfills. E-waste in landfills contributes to a large amount of environmental pollution and total amount of e-waste. When the e-waste is recycled one of the major steps is to shred the e-waste. The machines used to shred e-waste are large and

require large amounts of energy. After shredding e-waste it then needs to be sorted into its various components and materials. The sorting step is another part where companies evaluate the cost of the recycling process, some deciding it is not worth it and bringing it to a landfill. If the company doesn't have easy access to a landfill they may choose other cheaper methods of disposal. Taking the e-waste to less traveled areas and leaving it in areas that can be harmful to the environment can be an option that companies choose. If the companies continue to recycle the e-waste it leads to more processing and sorting. Eventually the e-waste is in a state that it is less impactful on the environment or able to be reused.

Recycling

One major problem with e-waste is it is a term covering a large variety of items. From batteries to televisions there are a lot of possibilities of components. Batteries have their own needs for safe recycling compared to circuit boards. With this in mind it makes recycling difficult. Trying to keep the chemicals in the batteries contained while retrieving the metals can be dangerous, so a different method of taking apart a control board from a television is required. When done correctly recycling e-waste prevents toxic materials from entering the environment, and harming people. Also, when done correctly recycling e-waste has possible gains. In circuit boards, gold can be used for its great conductive properties. Gold can be reused for more electronics or sold for other uses. The same can be said for the copper usually found in wiring. This sounds like a great benefit, but most companies find it more expensive than profitable. They dispose of their e-waste to other companies and countries. This is where some of the major problems with recycling come to bear.

Problems With Recycling

One major problem with e-waste is it often is shipped to developing countries to handle. These countries tend to have lackluster regulations and laws allowing the people who are receiving the e-waste to use poor practices. These can be wildly varied due to the differences in countries; some have problems with containment and processing; others have problems with labor. Some countries use child labor to take apart the devices. Their hands are better to remove small and delicate parts, as it can be difficult for larger hands to handle small components without breaking them. The way phones and similar devices are built can cause damage to hands working on it. The use of child labor means the kids are damaging their hands from broken glass or other sharp metals. Other countries have relaxed regulations for handling and disposing of chemicals and other materials, leading to possible chemical poisoning, or the chemicals leaking into the environment. These regulations lead to dangerous conditions but allow them to remain a cheap option. With this option being so much cheaper large businesses turn to it to handle e-waste. "Approximately 80% of e-waste from developed countries such as the United States, Western Europe, China, Japan, and Australia, amongst others, is transported to many developing countries such as India, Ghana and Nigeria and also China for material separating and recycling by using primitive techniques, without appropriate facilities to safeguard environmental and human (Aimin, et al., 2011)." (Sutawong, et al., 2020) A majority of e-waste is sent to facilities that don't have proper methods of disposal and deconstruction. These places usually create problems within the local community with the waste, from creating toxic water to infecting crops and animals with toxic chemicals.

Environmental Problems

E-waste is composed of various materials that need to be processed and have different properties. “E-waste is composed of 30% organic material (flame retardants, polymers, and glass fiber), 40% inorganic materials (non-ferrous and ferrous), and 30% ceramics material (alumina, mica, and silica) (Rautela et al., 2021). Inorganic metals contain base metals (tin, aluminum, copper, and iron), valuable metals (palladium, gold, and silver), heavy metals (cadmium, nickel, zinc, chromium, mercury, lead, and beryllium), and earth metals (tantalum, gallium, and platinum groups) (Kaya and Martin, 2016).” (Armughan et al., 2024) These show the composition of e-waste and that not everything is toxic, but some components are extremely toxic and hazardous. The heavy metals are a very dangerous element as the plants will absorb them then they will slowly transfer into animals and then eventually into people as they are consumed. This can easily cause heavy metal poisoning and harm an entire ecosystem. Another extremely hazardous part of e-waste are the flame retardants as they contain toxic chemicals to battle the effects of flames. These various hazards have multiple ways of getting into the ecosystem. The e-waste processing can result in incineration of materials into gas particles to be inhaled by people and animals. Countries with more relaxed regulations lead to companies disposing unwanted parts of e-waste in unregulated areas, leading to ground and water contamination. The contaminated areas spread as more plants and animals become contaminated, resulting with humans eating them and becoming sick. So, e-waste can completely ravage a population if disposed of wrong.

RESEARCH METHODS

A combination of research methods were used to get the best results for this project. The reasons why each method is chosen will be explained. The chosen methods are a survey,

interviews and secondary research. The combination of these three methods should lead to a sufficient coverage of the topic.

Survey

The first and primary research method is a survey. Survey was chosen as a research method because it will give a good idea of what the general population believes regarding this subject. Surveys are a good resource as shown by what D, Kuphanga, 2024 says about surveys “The questionnaire method presents researchers with a versatile and potent tool for data collection across diverse research domains”. This survey will be given to the general student body. An ideal sampling size of 50-75 responses from students is the target population of the researcher. This population is chosen because they are the people that will be affected and will be required to take initiative to interact with whatever program is developed by the college. Students are the main body for this sample population because they are the main demographic. Students make up the majority of people who visit the college and will interact with the sustainability program the most. This survey will try to accumulate the student body’s desires for e-waste recycling and what they are willing to do. This data will be collected and analyzed to create the final project report. The surveys will show what people responded to the questions and this will show percentages of people willing to do certain actions which will display the best ways the sustainability program can be implemented and how it should be presented. Using the ideas from the students will create the best program that they will take time from their days to interact with. This sample population will be reached via various methods. The survey will be an online survey, and links will be created and distributed with help from the Sustainability Committee. They have agreed to help distribute the surveys by posting links on the COTR portal

and other various sites. A poster introducing the survey will be produced with a QR code directing students and staff to the survey. These will be posted around the college. A table will also be set up in a common area so the researcher can promote participation in the survey. Various instructors may be asked to tell their classes about the survey and possibly provide a link. Hopefully this will give the researcher access to a large enough sample size.

Survey Examples

The Survey will have a variety of questions using a scale of answers and open-ended questions. The scale of answers will be; strongly agree, agree, neutral, disagree, strongly disagree. Open ended questions will allow the person taking the survey to give a more in-depth response creating new ideas or giving feedback on ideas for the program. Some examples of questions could be; “Are you willing to bring e-waste to the College of the Rockies” “Would you be willing to break down certain electronics before bringing it to the recycling center” “What electronics would you be comfortable bringing to the recycling program. For example, phones, laptops, batteries”. These are simple examples of what the survey will consist of, if you wish to see the current iteration of the survey see appendix 1. This survey is liable to change after initial testing to refine the survey.

Interview

The Interviews will be conducted by the researcher in person or online depending on the interviewee’s availability. The method of interviews were chosen because it gives more information and personalization to the data, allowing for a better and more nuanced conclusion. This quote helps solidify that aspect “Interviews provide an opportunity for participants to share their feelings, prejudices, opinions, desires, and attitudes towards

different phenomena they experience in the workplace or other organizational contexts.”

(Dunwoodie, K., Macaulay, L., & Newman, A., 2023) They will be roughly 15 to 30 minutes depending on the knowledge base of the interviewee. These interviews are to determine the history of College of the Rockies in relation to e-waste, e-waste recycling, and disposal and the possibilities that are feasible. With the information provided from the interviews the research project should be able to determine possible policy changes and programs that the college could implement. They could have valuable ideas on how to structure a program for e-waste recycling or on what would be the best ways to market it to students. These interviews will be recorded for the researcher to reflect on and use the data to further the project. The interviewees will be various staff from College of the Rockies, Kyle Brown, IT Manager and Rene Pelletier, Chief Information Officer, and other staff that wish to provide more input into this issue. These people are being selected because they have useful information on the topic and have the ability to collect the historical data that will be useful. These interviews will be a back-and-forth conversation leading to possible alterations in the questions depending on the scenario.

Interview Example

The interviewer will ask a variety of questions to best get the information from the interviewee to assist in the conclusion of the research project. These questions will have more data than the survey questions but will be less in quantity. Majority of these questions will be open ended and the interviewee will give varying responses allowing for further discussion. Some examples of questions would be; “What is the current policy on e-waste at the College of the Rockies” “What is the process for dealing with obsolete computers and laptops” “What are

the processes for getting new electronics like monitors and computers” “Is there a plan for acquiring new equipment to replace old, maybe a timeline” “What are your thoughts on creating a recycling program”. These are a few possible questions and may vary from interview to interview. More examples will be posted in appendix 2.

Secondary Research

Secondary research will be conducted to formulate possible outcomes and ideas for an e-waste program. This secondary research will be focused on what other businesses and colleges are currently doing for e-waste. Secondary research will help build a knowledge base for the research project. The less expensive and ease of access will help get a substantial amount of useful data as stated by Kelly, Martin-Peters, and Farber in their writing on the subject. Looking at journals and articles to see what other colleges of equal size have done and are doing. Similar sized businesses are also a good option to investigate. This is to help develop possibilities that will be recommended at the end of the research project. The desire is to look at 6 to 8 other businesses to create an idea of what is possible at College of the Rockies.

Data Analysis

The data from these research methods will be compiled to determine the suggestions and possibilities for the College of the Rockies. Data from the surveys will be organized and analyzed to determine what the students know of e-waste, creating possible alternative plans. This data will also be used to find patterns within the students formulating generalizations that can be used for planning. Graphs and percentages will be used to visually show the differences between the groups providing a visual aid. Any data that is an extreme outlier will be noted but removed if it hinders the accuracy of the collected data. The data from the secondary research

and interviews will be compared to each other to see what the College can do and is already doing. These data sets will create a strong foundation for the recommendations that result from this research project. The researcher will compile all this data into a report in an easily readable format allowing readers to create their own ideas. The report will help explain the reasons for the researcher's final suggestions on this topic.

Expected Outcomes

This research project is expected to help College of the Rockies determine possible routes for sustainable e-waste management. The data acquired will be regarding what staff and students wish to see improved on this topic, providing information to help the betterment of College of the Rockies and the local community. This research will not be able to give a definitive answer to what the best solution is, only to give the data to help make educated decisions. This research will show what other organizations are doing with e-waste and highlight more sustainable avenues to explore.

Timeline

The window of time for research is fifteen weeks, starting January 5th till April 20th. In this window of time all research should be completed, allowing it to be compiled and analyzed. The first two weeks will be getting approval from the ethics department and the project certified. The next two weeks will be testing and finalizing the survey before it is released. The survey will then be released in the first week of February to start collecting responses. Responses will continue to be submitted until the second week in April when the answers will be compiled and turned into data. During this period the researcher will occasionally have a display table at the College to promote the survey. The researcher will also be conducting the

interviews when the interviewees are available in that time frame. Similarly, the secondary research will be conducted during this time. By the end of May, the report should be finalized and ready for submitting. In the beginning of June, the report will be used to create a presentation so the outcomes and information of the research can be presented to interested parties.

Budget

The main concerns for the budget of this project are creating the posters and the survey. Posters will be created by the researcher and printed using their allotted printing budget from the college. For the survey there are two main possibilities, using Google Forms or Survey Monkey. If Google Forms is used the creation of the survey would be free. If Survey Monkey is used it will be \$119 a month for four months totaling \$476. Besides this no additional materials need to be purchased for this project.

FINDINGS

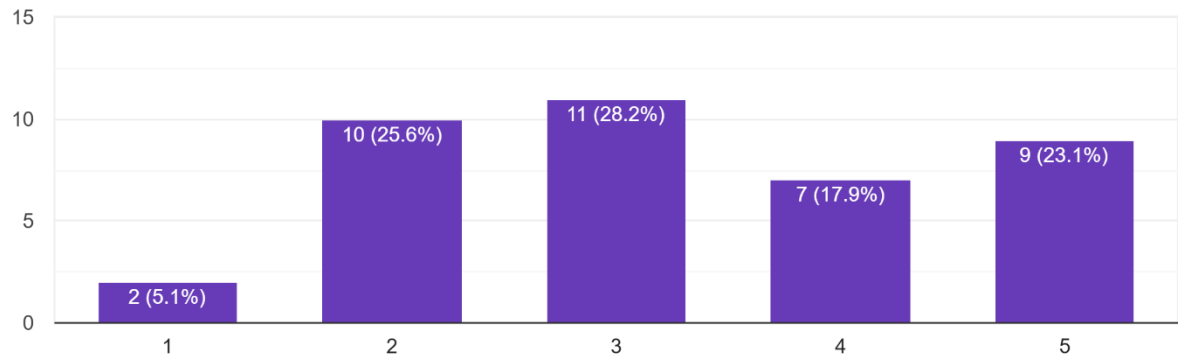
Survey Responses

For this project there were a total of 40 survey responses, the results of which will be shown below. This survey consists of seventeen questions.

Question 1:

How aware are you of the effects of electronic waste on the environment? (1 being very aware 5 being very unaware).

39 responses

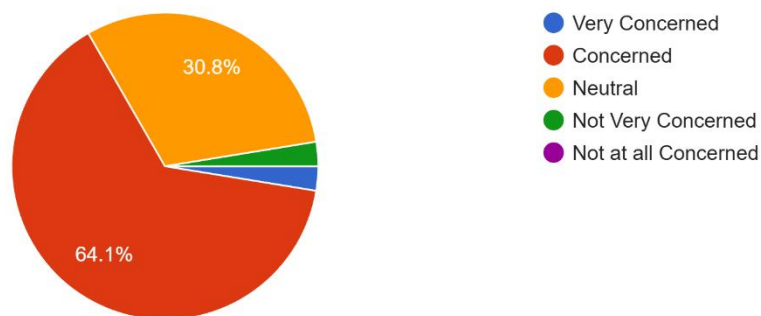


30.7% of those that responded were very aware or aware. The remaining 69.3% were neutral, unaware or very unaware. This indicates that education on the environmental effects of e-waste is needed.

Question 2:

How concerned are you about the issue of electronic waste (e-waste) and its disposal?

39 responses

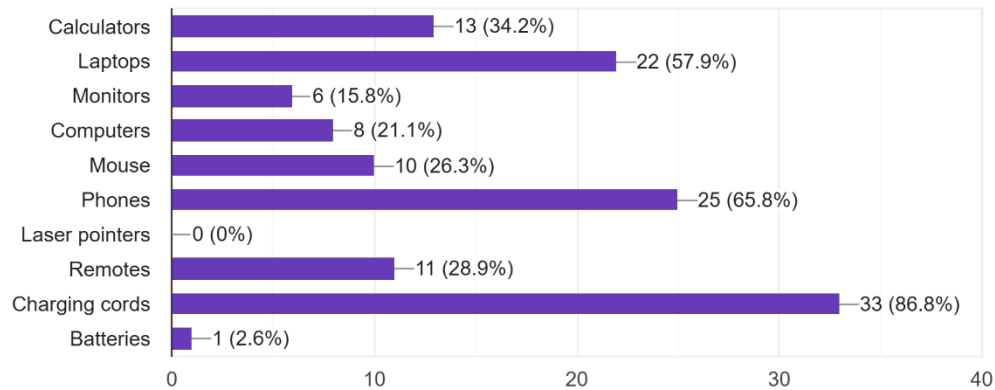


Majority of responses are for concerned (64.1%) and neutral (30.8%). With very concerned and not very concerned both at 2.6% with one vote.

Question 3:

What type of electronic waste do you generate? (pick all that apply)

38 responses

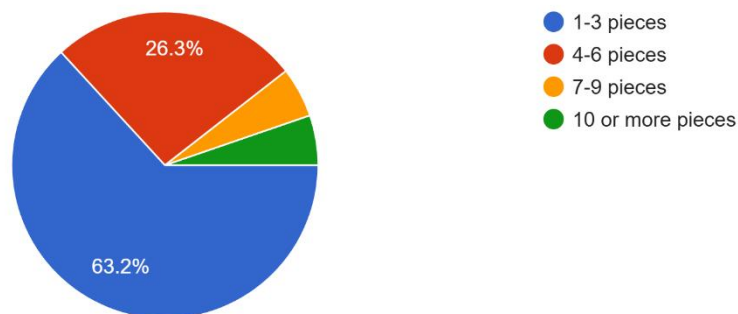


For this question there was a variance in answers with most people generating Charging cords, Phones, and Laptops.

Question 4:

How much unusable e-waste do you currently have?

38 responses

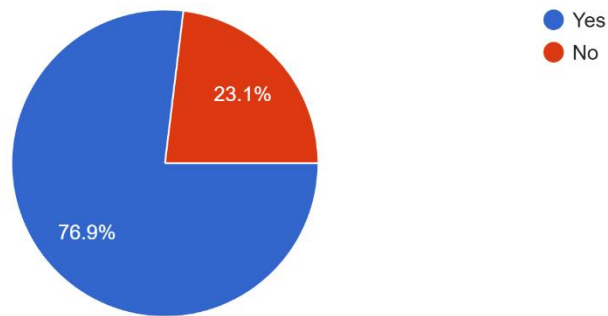


Majority of people who took the survey said they have 1-3 pieces of e-waste.

Question 5:

Do you store your e-waste?

39 responses

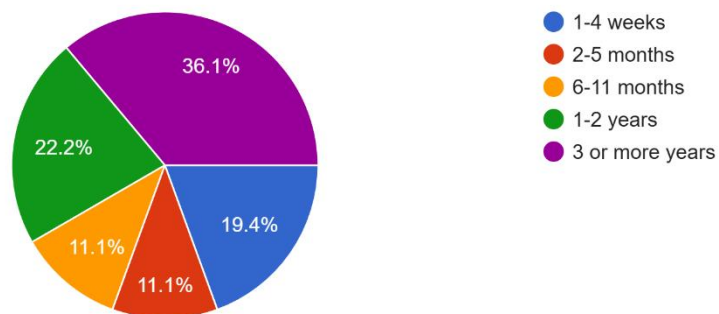


Majority of responders said they keep e-waste.

Question 6:

If yes how, long do you store it before disposing of it?

36 responses

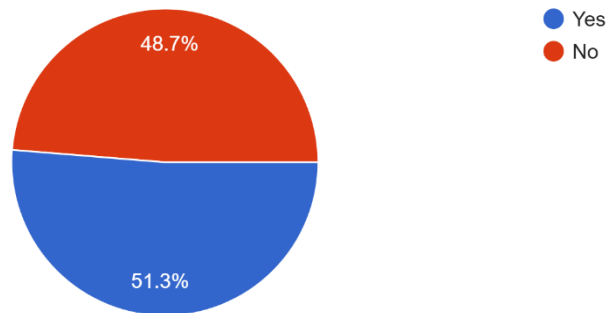


Of the people who kept e-waste, majority of them would keep it for longer periods of time.

Question 7:

Do you dispose of e-waste in the garbage?

39 responses

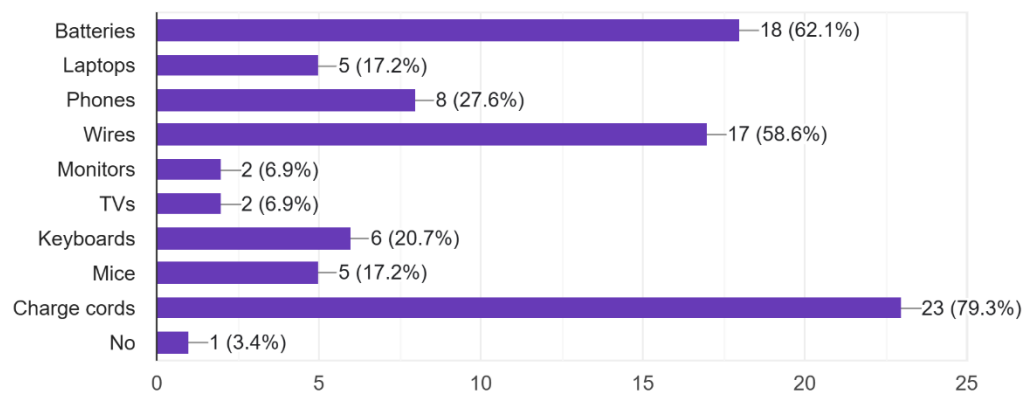


Less than half of the responders recycle e-waste

Question 8:

If yes, what kind of e-waste? (pick all that apply)

29 responses

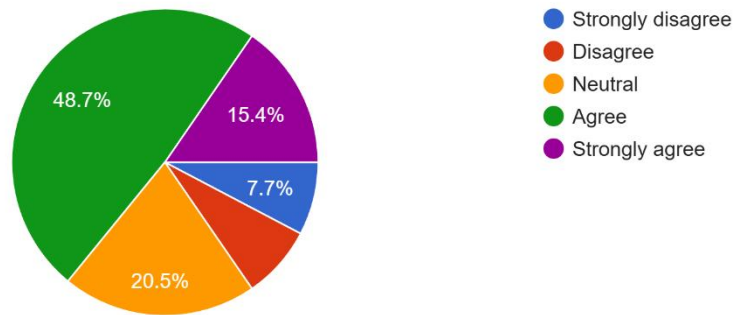


Charging cords, Batteries and Wires were disposed of in the garbage the most.

Question 9:

It is difficult to dispose of e-waste in more sustainable manners other than in the garbage?

39 responses

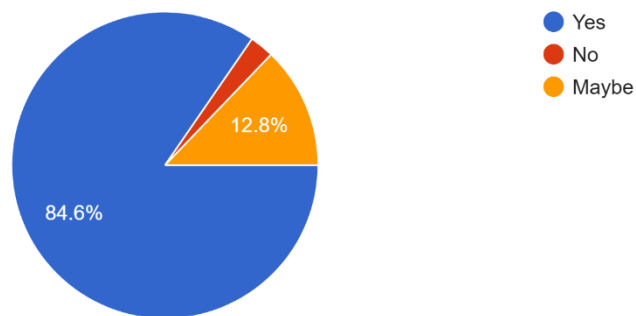


A large majority of people who took the survey answered in agreement with e-waste being difficult to sustainably dispose of.

Question 10:

If there was an easy way to properly dispose of e-waste, would you?

39 responses

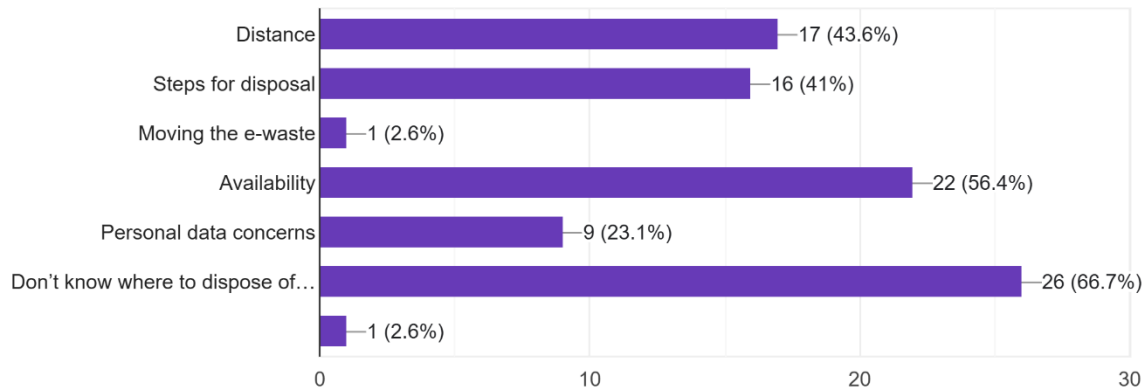


Only one person answered they would not change their disposal methods.

Question 11:

What would keep you from disposing of e-waste at a proper recycling facility? (pick all that apply)

39 responses

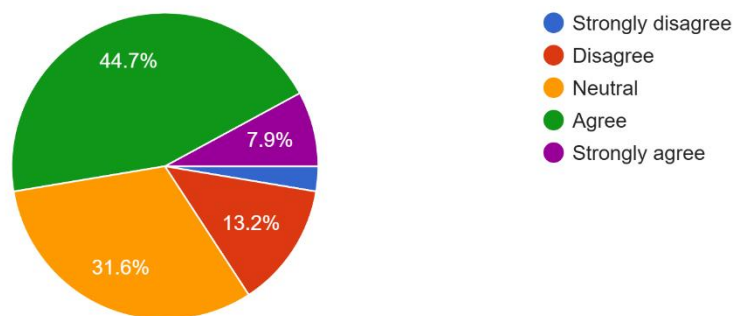


The largest problem with disposal is knowledge of the location and how easily accessible it is.

Question 12:

I would go out of my way to dispose of e-waste.

38 responses

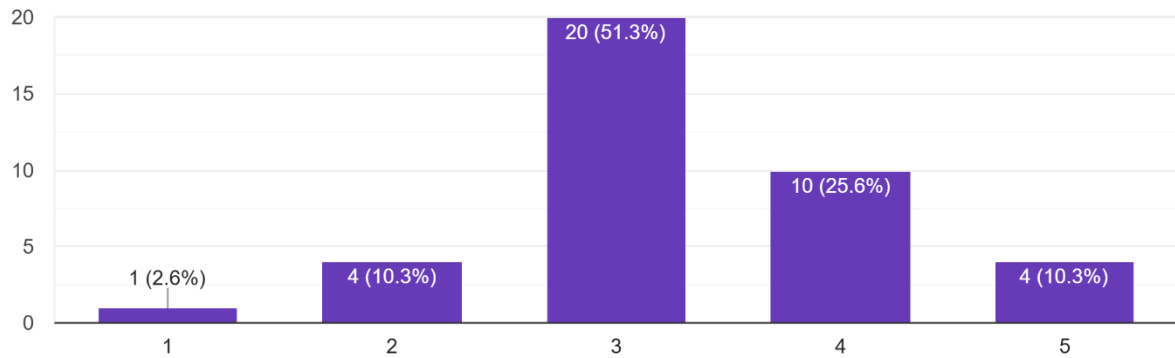


Majority agreed with they would go out of their way with 17 agreeing and 3 disagreeing.

Question 13:

On a scale from 1-5 if there were multiple steps to this system, would it discourage you? (1 being not at all discouraged 5 being extremely discouraged)

39 responses

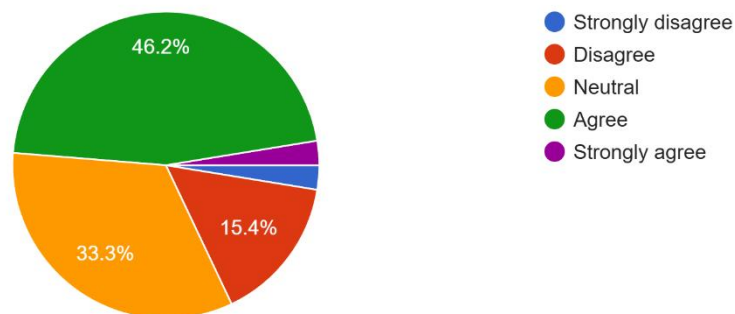


Having multiple steps leads to uncertainty of using the disposal system.

Question 14:

I am willing to dismantle some e-waste before recycling it.

39 responses

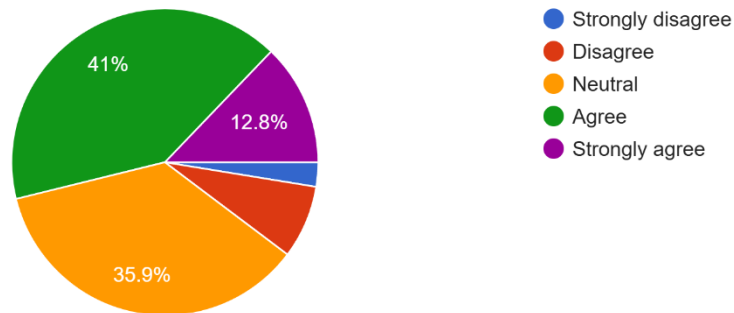


Less than half of the people agree to be willing to dismantle e-waste before recycling.

Question 15:

I'm concerned that if I dispose of e-waste at a recycling center it will not be properly recycled?

39 responses



There is a majority of people who are worried about the e-waste being recycled if brought to a recycling center.

Question 16:

What personal e-waste items would you not be willing to give to a recycle center?

Majority of the answers contained phones and devices with personal data

Question 17:

Do you have any ideas for College of the Rockies in regard to e-waste recycling?

The answers consisted of posters with instructions, seminars, classes and bins for recycling.

Question 18:

What would you be willing to do to help the college be more sustainable with e-waste?

There are a few people willing to volunteer and bring awareness. Others are willing to collect e-waste and bring it to facilities.

Interviews

Rene Pelletier and Kyle Brown were interviewed for this project. Below are the questions and relevant answers.

Q: What is your job or position at College of the Rockies?

Rene Pelletier: Chief Information Officer

Kyle Brown: IT Manager

Q: Do you deal with e-waste in your current role?

Mainly in replacing old technology

Q: Do you know of the current policies/procedures regarding e-waste?

No current formal policies, only informal saying of “recycle it”. Using local recycling business.

Data for computers and the like is destroyed.

Q: On average how long do electronics last at the College of the Rockies?

Laptops 4-6 years, larger devices 15 years, the majority of devices are used until they are no longer functional.

The electronics are very expensive the ideal would be to have less expensive devices and replace it on a more frequent bases.

Q: Do you have any suggestions to improve the e-waste policies/procedures?

The college is too small of an organization to need major procedures besides just recycling. The electronics are not complex enough to do anything more than bring to a recycling business.

Q: Have you worked for other organizations that have had an e-waste program? If so, what could be implemented from previous experience?

With government of B.C. and everything went to central government.

Located in Vancouver where services were more extensive and couldn't be implemented here due to population size.

Q: Do you fill out any reports regarding e-waste?

Not aware of any reporting on e-waste.

Q: Should there be any reports?

Constraints from budgets and provincial supply agreements make it unnecessary. The reports wouldn't change any behaviour.

Q: Have you ever heard of The Sustainability Tracking, Assessment & Rating System (STARS)?

Yes

Q: If you have would it be useful to the college?

There are uses but a system more tailored to the college would be more useful.

Q: Are there parts of it that wouldn't be useful to use? are there any issues with STARS?

It is very expensive and the college doesn't necessarily have the budget for it. It is unlikely to impact the college in a meaningful way so not financially viable.

Secondary Research

The researcher looked for organizations of similar sizes to compare e-waste procedures and reporting. The most comparable college is Selkirk College, being of similar size and located in BC. According to Selkirks College's *2024 PSO Climate Change Accountability Report and Sustainability Policy*, they have a large amount of sustainability initiatives and mandated reporting. Selkirk College, however, has very little in terms of e-waste reporting and programs specifically. The only mention of e-waste *2024 PSO Climate Change Accountability Report and*

Sustainability Policy is that recycling is important and practiced at Selkirk College. E-waste is also mentioned in Selkirk College's *STARS* report in the *OP-18: Waste Minimization and Diversion* with only a "yes". E-waste is included in the total reported recycling number. To see what other similar sized BC colleges were doing the researcher looked at multiple colleges and chose to display College of New Caledonia and Northern Lights College. College of New Caledonia has extensive sustainability plans that cover a large portion of topics, however they also do not have any programs or policies regarding e-waste disposal specifically. The only mention of e-waste disposal is in a *2011 Carbon Neutral Action Report* establishing the desire to create "green standards for goods replaced frequently". Their *2024 PSO Climate Change Accountability Report*, focuses more on larger topics such as emission reduction and paper consumption. No e-waste numbers or plans are reported on. Northern Lights College brings up general disposal of non-capital goods. In their *Disposition of Goods Policy* they state "Environmental responsibility is a priority. Where assets are deemed obsolete, unusable and have no market value, they will be recycled to the fullest extent possible, in accordance with applicable regulations and best practices to reduce environmental impact. If recycling is not feasible, final disposal—such as delivery to a landfill, should only occur after more sustainable options have been considered." (2025, pg2) This shows that they plan to recycle everything possible including e-waste. Northern Lights College does not have specific policies for e-waste beyond the destruction of hard drives to protect data. It is, however, common for smaller colleges to have little to no reporting on e-waste. To look at a much larger organization University of British Columbia was selected. UBC has a large and detailed sustainability plan and reporting. UBC has a specific section for e-waste, displaying useful information to the students

and linking to many resources they use. The UBC website links to where their e-waste goes and how students can dispose of their own e-waste in local recyclers and even their own disposal program. UBC uses *Electronic Products Recycling Association British Columbia (EPRA)*. EPRA is a recycling system that allows businesses to hand over all e-waste to them. The e-waste stays in North America and is broken down and recycled.

STARS

The Sustainability Tracking, Assessment and Rating System or STARS is a system for colleges and universities to report and disclose sustainability information covering a vast range of categories, such as what types of classes are offered, how water is utilized, etc. Within STARS there is no specific category for e-waste instead it falls into Waste Generation and Recovery, in a, small section declaring if e-waste was recycled or not. An account is required to view the reports, but they are available. Colleges and universities can opt in or out of the various categories to report on and do not need to report on everything. For example, The Justice Institute of British Columbia reports on a variety of sustainability information but has opted out of waste reporting. Whereas, Dawson College goes into more detail stating that they attempt to refurbish and donate old cellphones if possible, otherwise they are recycled. Though STARS does have a wide variety of options for sustainability reporting, it does not have many for the purposes of e-waste specifically. *"Identifying Opportunities for Enhanced Ewaste Management in Canadian PostSecondary Institutions"* author Emilia Nietresta goes into detail on the reporting of STARS in regards to e-waste and the possibilities for post-secondary institutions.

DISCUSSION

Surveys

The surveys for this report had some interesting results. The student body survey showed that there is concern about e-waste and proper disposal, and that some people are willing to go out of their way to dispose of e-waste, but that overall knowledge of this disposal is lacking. The majority of the respondents agree that it is difficult to dispose of e-waste in a sustainable manner, and that not knowing where to dispose of it is a major deterrent. There is a substantial connection between the people who responded saying they are concerned about e-waste and the proper disposal of it, and those who store it for a longer period of time. The connection suggests that if people had an easy way of disposing of e-waste they would, and that they don't want to dispose of it in landfills. Respondents also answered that they would be hesitant to bring devices like phones and laptops to the recycle center due to personal data not being wiped completely. Some of the respondents had recommendations for the college, such as providing information on proper disposal to the students in the form of posters, online instructions, and classes or seminars. Another common recommendation was for bins to be placed around campus for e-waste to be deposited.

Interview

The interview with Rene Pelletier and Kyle Brown sheds light on the College of the Rockies system, which is set up to generate less e-waste. There is a local recycling center that all of the small and average size e-waste is brought to for no charge beyond employee time and fuel. Some objects like larger T.V.s need to be taken to a special facility, but this is a very rare

occurrence. Equipment is maintained and kept functional until it is obsolete or non-functional, usually over a few years. This system causes College of the Rockies to generate less e-waste, which negates the need for more complex systems. In addition, the location of College of the Rockies being located in a smaller city means that the infrastructure for larger more complex disposal systems is simply not available. If College of the Rockies was in Vancouver there would be more options and the ability to choose better systems. Some manufacturers offer deals for higher end equipment and hardware, but College of the Rockies doesn't have use for this more advanced hardware. College of the Rockies must use approved providers for devices like laptops; they are provided with a discount better than most organizations but nothing special in terms of disposal.

Secondary research

The majority of colleges the size of College of the Rockies do not report on or do anything special for e-waste. Organizations of this size are simply too small to properly create programs or policies this specific. Taking on more in-depth reporting or programs to deal with e-waste can be costly and not feasible for a smaller organization. That said, some actions can be taken by smaller organizations to display their e-waste disposal and bring light to it happening on general sustainability reports. Organizations like STARS are good for overall sustainability and can shed light on multiple avenues for improving sustainability, but for the specifics of e-waste they are not the most useful program. Creating systems similar to UBC could be a useful sustainability effort for College of the Rockies, providing accessible information for students to know resources they can use for e-waste in the local community.

RECOMMENDATIONS

Based on reports of what other post-secondary schools do for e-waste sustainability and the interviews with College of the Rockies staff, the researcher would not recommend any significant changes. The overall e-waste generation is small, and the local recycling depot can handle all of College of the Rockies needs. College of the Rockies would benefit from the transparency of recording waste generation and disposal, but it would not have an affect on the amount generated. In regard to their impact on the overall sustainability outside of what College of the Rockies generates; giving information to help the students recycle e-waste via posters, links on the portal, and through classes and seminars would be a benefit to them and the local community. Educating students on the environmental effects of e-waste. Posters and resources on where to recycle e-waste. STARS could be a useful tool and program if the wish is to report on the entirety of College of the Rockies sustainability. If only looking to report on e-waste I would not recommend using STARS due to its lack of specificity. The cost of STARS and its usefulness for other areas of sustainability should be looked into and questioned.

Recommendations for Further Research

The researchers can make improvements for the next research project through the following list of recommendations.

1. Budget to include the cost for hosting a QR code for the duration of the research, which was \$14 per month.
2. Spend more time designing an eye-catching poster for people to stop and read.
3. Have multiple people help recruit for the survey and ask others to help distribute the survey among students.

4. Include questions on the survey to create groups or identifiers to allow for more cross question analysis.
5. Create a clearer and more concise research question to help focus the project.

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APPENDIX 1

This is a survey about e-waste at the College of the Rockies. Thank you for taking time to complete this survey. You can withdraw from this survey at any time. If you withdraw your answers will not be added to the data pool.

Survey Questions

1. How aware are you of the effects of electronic waste on the environment? (1 being very aware 5 being very unaware).

2. How concerned are you about e-waste?

Very Concerned Concerned Neutral Not Very Concerned Not Concerned At All

3. What type of electronic waste do you generate?

Calculators	Phones
Laptops	Laser pointers
Monitors	Remotes
Computers	Charging cords
Mouse	Other (please specify)

4. How much e-waste do you currently have?

1-3 pieces 4-6 pieces 7-9 pieces 10 or more pieces

5. Do you store your e-waste?

Yes No

6. Do you dispose of e-waste in the garbage?

Yes No

7. If yes, what kind of e-waste? (pick all that apply)

Batteries	TVs
Laptops	Keyboards
Phones	Mice
Wires	Charge cords
Monitors	Other

8. It is difficult to dispose of e-waste in more sustainable manners other than in the garbage?

Strongly disagree Disagree Neutral Agree Strongly Agree

9. If there was an easy way to properly dispose of e-waste, would you?

Yes No Maybe

What would keep you from disposing it in this way?

Distance	Availability
Steps for disposal	Personal data concerns
Moving the e-waste	Don't know where to dispose of it properly
Other	

10. I would go out of my way to dispose of e-waste.

Strongly disagree Disagree Neutral Agree Strongly Agree

11. On a scale from 1-5 if there were multiple steps to this system, would it discourage you?

(1 being not discouraged 5 being extremely discouraged)

1 2 3 4 5

12. I am willing to dismantle some e-waste before recycling it.

Strongly disagree Disagree Neutral Agree Strongly Agree

13. Would you be willing to help get the word out about an e-waste recycling/disposal program?

Yes No

14. I'm concerned that if I dispose of e-waste at a recycling center it will not be properly recycled?

Strongly disagree Disagree Neutral Agree Strongly Agree

15. What personal e-waste items would you not be willing to give to a recycle center?

16. Do you have any ideas for College of the Rockies in regard to e-waste recycling?

17. What would you be willing to do to help the college be more sustainable with e-waste?

APPENDIX 2

Interview Questions

1. What is your job or position at College of the Rockies?
2. Do you deal with e-waste in your current role?
3. Do you know of the current policies/procedures regarding e-waste?
4. If so, what are the policies/procedures for dealing with e-waste?
5. On average how long do electronics last at the College of the Rockies?
6. Do you have any suggestions to improve the e-waste policies/procedures?
7. Have you worked for other organizations that have had an e-waste program? If so, what could be implemented from previous experience?
8. Do you fill out any reports regarding e-waste?
9. Should there be any reports?
10. Have you ever heard of The Sustainability Tracking, Assessment & Rating System (STARS)?
11. If you have, would it be useful to the college?
12. Are there parts of it that wouldn't be useful to use? are there any issues with STARS?
13. Are there any issues with STARS?

APPENDIX 3

Survey Consent Form

Consent Form for Surveys/Questionnaires

Study Title: E-waste at the College of the Rockies

You are being asked to take part in a research study called “E-waste at the College of the Rockies” conducted by Andrew Macdonald, Student, at the College of the Rockies. The goal of this research is to determine what the College of the Rockies can do to help with sustainability in regards to e-waste.

What the study is about: The purpose of this research is to collect information on what you believe the college can do and what you are willing to do in regard to e-waste.

What we will ask you to do: You are invited to complete the attached questionnaire focused on e-waste and possible solutions. The attached questionnaire has been designed to evaluate how you e-waste and its disposal. It should take approximately 15 minutes to complete.

Participation

Your participation is voluntary. You may decline filling out the questionnaire or leave any questions blank that you don’t wish to answer. Your participation with this questionnaire will not impact your course marks.

Benefits

You will receive no direct benefits from participating in this research study. However, your responses may help us learn more about how to improve the College of the Rockies sustainability.

How will your information be used

Your information will be analyzed to create statistical data. This data will be used as evidence in a report and presentation to College of the Rockies. Your information will be seen by the researcher and Greg McCallum

Risks

There are no foreseeable risks involved in participating in this study other than those encountered in day-to-day life.

Confidentiality

Your questionnaire answers will be returned to the researcher. Your name will not be attached to the questionnaire. No one will be able to identify you or your answers, and no one will know whether or not you participated in the study. Data obtained from this research will be kept confidential and reported in general terms.

If you have questions: please contact Andrew Macdonald at amacdonald@cotr.bc.ca

If you have any questions or concerns regarding your rights as a subject in this study, you may contact the Research Ethics Board Chair (REB), Daniel Wiens, at dwiens@cotr.bc.ca.

By completing and returning the questionnaire you agree that you have:

1. Read the above information
2. You voluntarily agree to participate
3. That you agree to have your data used for program improvement and/or publication

APPENDIX 4

Interview Consent Form

Consent Form

Study Title: E-waste at the College of the Rockies

You are being asked to take part in a research study of how sustainability can be improved at the College of the Rockies regarding e-waste. This is student research required as an assignment for the following course MGMT 470: Project Development and Research at the College of the Rockies. We are asking you to take part in this study because you are someone with valuable ideas or information for the topic. Please read this form carefully and ask any questions you may have before agreeing to take part in the study.

What the study is about: The purpose of this study is to determine ideas and possibilities to improve sustainability at the College of the Rockies regarding e-waste.

What we will ask you to do: If you agree to be in this study, we will conduct an **interview** with you. The interview will include questions job title and will focus on questions related e-waste will take 15-30 minutes to complete. With your permission, we would also like to tape-record the interview.

How will your information be used

Your information will be analyzed to create statistical data. This data will be used as evidence in a report and presentation to College of the Rockies. Your information will be seen by the researcher and Greg McCallum

Risks and benefits:

We do not anticipate any risks to you participating in this study other than those encountered in day-to-day life. You may choose not to answer some of the questions asked and if you do not wish to disclose certain information about yourself you may do so at any time during the study.

This project will obtain valuable information about how e-waste can be better recycled and the college can help with this process.

Compensation: There is no compensation allotted for participating in this study. It is voluntary.

Your answers will be confidential. The records of this study will be kept private. In any sort of report we make public we will not include any information that will make it possible to identify

you. Research records will be kept in a locked file in the course instructor's office; only the researchers will have access to the records. If we audio-record the interview, we will destroy the audio file after it has been transcribed, which we anticipate will be within two months of its taping. The audio transcripts will be de-identified (meaning your name and identifying information) will be removed.

Taking part is voluntary: Taking part in this study is completely voluntary. You may skip any questions that you do not want to answer. If you decide not to take part or to skip some of the questions, it will not affect your current or future relationship with the College of the Rockies. If you decide to take part, you are free to withdraw at any time.

If you have questions: The researchers conducting this study are Greg McCallum (Lead Investigator and Faculty Member) and the MGMT: 470 student(s). Please ask any questions you have now. If you have questions later, you may contact Greg McCallum: gmccallum@cotr.bc.ca or Tel: (250) 489-2751 ext 3623

If you have any questions or concerns regarding your rights as a subject in this study, you may contact the Research Ethics Board Chair (REB), Daniel Wiens, at dwiens@cotr.bc.ca.

You will be given a copy of this form to keep for your records.

Statement of Consent: I have read the above information, and have received answers to any questions I asked. I consent to take part in the study.

Your Signature _____ Date _____

Your Name (printed) _____

In addition to agreeing to participate, I also consent to having the interview tape-recorded.

Your Signature _____ Date _____

Signature of person obtaining consent _____

Date _____

Printed name of person obtaining consent _____

Date _____

This consent form will be kept by the course instructor for at least three years beyond the end of the study.

APPENDIX 5

Ethics Board Approval

Date: February 9, 20226

Study Number: COTR REB CAP 2026 08

Study Title: E-Waste at the College of the Rockies

Principal Investigator: Andrew Macdonald

CC: Greg McCallum

Dear Andrew,

Thank you for your submission of your applied research study. We have received your ethics application, invitation script, survey instrument, interview questions, and consent forms. As per delegated review your study has been found to be ethically acceptable.

The College of the Rockies REB adhere to the Tri-Council Policy Statement "Ethical Conduct for Research Involving Humans." Please note that this ethical clearance is contingent upon adherence to the submitted protocol. Prior permission must be obtained from the COTR REB before implementing any modifications(s) to the submitted documentation.

There are a few additional requirements as you move forward in your research. You are to notify the COTR REB immediately if any untoward or adverse events occur during your research or if data analysis or other review reveals undesirable outcomes for participants (including researchers). We ask that you submit a progress report on February 9, 2027 and a study completion report if the research is completed prior to this date.

These forms can be found on the COTR REB website <http://www.cotr.bc.ca/REB/>

Please accept the Board's best wishes for continued success in your research.

Yours sincerely,

A handwritten signature in black ink, appearing to read 'D. Wiens', with a long horizontal stroke extending to the right.

Daniel Wiens RN, BA, MA

Chair, College of the Rockies Research Ethics Board

APPENDIX 6**Study completion form****Study Completion Report Form****College of the Rockies Research Ethics Board (REB)**

This form is to be used when the approved study is completed. It must be returned via email to the REB chair.

A. Principal Investigator

Last Name: Macdonald

First Name: Andrew

Department/Faculty: Business

Email: c0076986@cotr.bc.ca

Phone: 2504329818

Fax:

Mailing Address: 220 Buchanan St., Kimberley, BC V1A 1V7

Title/Position: Student

B. Project Information

Project Title: E-waste at College of the Rockies

Termination Date of Study (Date of last contact with participants or when results will be posted/shared with participant, or date of last data collected- please provide rationale for which is most appropriate): 2025-05-17 last date of data collected for secondary research.

For Research Ethics Board use	HREB Study ID#:	
Research Ethics Board Chair Approval:	Date:	
Start Date:	Expiry date:	File closed:

C. Reporting Measures

Project Summary (Brief outline of project and findings): use of e-waste at College of the Rockies and how it could be improved. At the size of the College not much more can be done besides reporting and informational.

Total Number of Research Participants Recruited: 42

Total Number of Research Participants Withdrawing from the Study: 0

Adverse Events or Unanticipated Problems Involving Risk: (Were there any unusual and/or severe complications, adverse events or unanticipated problems involving risk to the participants or others?) no

Unanticipated Benefits of the Study: none

Principal Investigator

Andrew Macdonald

Signature

Andrew Macdonald

Print Name

2026-05-21

Date