



**Analyzing Menstrual Product Consumption on WPI's Campus
to Provide Future Product Access Recommendations**

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Leadership Statement

Our team consisted of two Industrial Engineering students, Rachael Mair and Sydney Yeaw, and one Business Analytics student, Emily Thayer. All members of the team worked together to develop the entirety of the content, but in many instances one person took point on the research and development of a topic before the team worked to edit it. All team members took turns managing communications with our external stakeholders; Rachael contacted the WPI Facilities Department, Emily contacted PERIOD@WPI, and Sydney contacted Aunt Flow. Below, please find a breakdown of who took point on each topic.

The background research was conducted by all members of the team. Sydney focused on researching PERIOD, Emily focused on the precedence and benchmarking of menstrual inequality, and Rachael focused on the background sections of the methods. All members worked together to edit and organize this chapter after the initial content was created.

Using background from our disciplines, all members of the team worked to develop analysis methods. Sydney focused on survey distribution methods and analytics, working with Emily and Rachael to develop the survey and interview questions. All members of the team took initiative on reaching out to faculty for interviews, and rotated who conducted the interview and analyzed the results.

Emily focused on researching decision matrix studies and methods for developing ranking criteria. Sydney and Rachael assisted Emily in finalizing the ranking criteria. While the team completed much of the scenario analysis through group discussion, Emily took point on developing the Citron Hygiene analysis, Sydney took point on the Aunt Flow analysis, and Rachael took point on the WPI Health Services analysis.

Rachael focused on compiling the team's information to develop the process analysis with a flowchart, with support from Emily and Sydney. Sydney researched demand for menstrual products and developed an estimate for demand on WPI's campus. The team then worked together to determine how to estimate high, medium, and low demand from this estimate. Based on the demand estimate, Rachael and Sydney developed an economic ordering quantity estimate.

The sensitivity analysis research was conducted by Emily, and the team subsequently conducted the revised sensitivity analysis through discussion. Rachael recorded the initial results, and Sydney and Emily edited and contributed additional information.

Finally, the team worked together to develop our analysis of the potential solutions and recommendations. We utilized everything we learned from the sections we took point on and from our previous collaborations when discussing this content.

Abstract

Menstrual inequality and accessibility issues are a problem for students at Worcester Polytechnic Institute (WPI) due to price and transportation barriers, and poor product dispenser placement. Our team assessed the existing menstrual product distribution system at WPI using cost analysis tools and conducted interviews and surveys with faculty and students to gauge demand and desirable features of product provision. Our team identified a solution, which requires a third-party subscription, by comparing alternatives using process analysis, cost benefit analysis, and a decision matrix with defined ranking criteria.

Table of Contents

Acknowledgements	i
Leadership Statement.....	ii
Abstract	iv
Table of Figures.....	ix
Table of Tables.....	ix
1.0 Introduction	1
2.0 Literature Review	4
2.1 Access to Menstrual Products for Students.....	4
2.2 Free Menstrual Products on College Campuses in the United States.....	5
2.2.1 Pilot Trial Campaigns.....	6
2.2.2 Permanent Implementations	7
2.3 PERIOD The Menstrual Movement	8
2.4 The Relevance of Menstrual Poverty on WPI’s Campus.....	9
2.4.1 WPI’s Efforts in Product Provision.....	10
2.5 Background on Methods	10
2.5.1 WPI Free Product Pilot Program	10
2.5.2 Surveys	11
2.5.3 Axiomatic Design.....	11
2.5.5 DMAIC Methodology Structure.....	12
2.5.6 Decision Analysis Tools.....	12
2.6 Conclusion.....	13
3.0 Methodology.....	14
3.1 Understand the Opportunity for this Project and the Precedent at Other Schools.....	14
3.1.1 Interviews with PERIOD@WPI and Dean Perlow.....	15
3.1.2 Measure Campus Need and Demand	15
3.2 Identify Campus Opinions Related to Menstrual Product Provision.....	16
3.2.1 Menstrual Product Campus-Wide Surveys.....	16
3.2.2 Identify Faculty and Staff Interest and Attitude	18
3.3 Utilize Scenario Analysis Tool to Evaluate Menstrual Product Program Alternatives.....	19

3.3.1 Scenario Analysis.....	20
3.3.2 Cost Analysis	21
3.3.3 Process Analysis	21
3.3.4 Inventory Analysis	22
3.3.5 Evaluating Potential Solutions.....	22
3.4 Select Preferred Menstrual Product Program	23
3.5 Develop an Implementation Plan to Sustain Preferred Menstrual Product Program.....	24
4.0 Market Input	25
4.1 Free Product Trial Data Analysis.....	25
4.2 Survey Analysis	28
4.2.1 D-Term Post-Trial Survey Results.....	29
4.2.2 A-Term Opinion Survey Results.....	31
4.3 Interview Results	34
4.3.1 Environmental and Health Considerations	35
4.3.2 Marketing Considerations.....	35
4.3.3 Facilities Considerations.....	36
5.0 Development and Evaluation of Alternatives	37
5.1 Axiomatic Design	37
5.2 Interactive Scenario Analysis Tool.....	38
5.3 Demand Estimates	40
5.4 Development and Evaluation of Alternatives.....	42
5.4.1 Creating a Benchmark with the Existing Citron Hygiene Contract.....	42
5.4.2 Citron Hygiene Free Product Machines	43
5.4.3 Health Services Free Product Plan.....	43
5.4.4 Free Product Machines through a Subscription Service.....	44
5.5 Process and Inventory Analysis.....	46
5.6 Establishing Scoring for Stakeholder Criteria.....	48
5.6.1 Economic Criteria	48
5.6.2 Investment in Long-Term Business Criteria.....	49
5.6.3 Social/Environmental Criteria	50
5.6.4 Other Criteria	51

5.7 Ranking Solutions against Criteria	52
5.7.1 Alternative 1: Free Products with Citron Hygiene.....	53
5.7.2 Alternative 2: WPI Health Services Free Product Plan.....	55
5.7.3 Alternative 3: Free Products through Aunt Flow and WPI Facilities	56
5.7.4 Alternative 4: Maintain Existing Contract with Citron Hygiene.....	58
5.7.5 Exploring Alternative Weighting to Represent Stakeholder Opinion.....	60
5.7.6 Selection of Preferred Alternative.....	62
5.8 Implementation Plan	64
6.0 Conclusions and Recommendations	66
6.1 Recommendations.....	66
6.1.1 Recommendation for Action.....	67
6.1.2 Recommendation for Further Research.....	68
6.1.3 Recommendation for Education.....	68
6.1.4 Recommendation for Transition	68
6.2 Conclusion.....	69
7.0 Reflections.....	70
7.1 Discussion of Design	70
7.2 Discussion of Constraints.....	71
7.3 Discussion of the Experience and Acquiring and Applying New Knowledge	72
7.4 Discussion of Teamwork.....	73
References.....	74
Deliverables.....	77
Deliverable #1: Scenario Analysis Tool	77
Deliverable #2: Facilities Flowchart of Processes.....	77
Deliverable #3: Decision Matrix using Ranking Criteria	77
Appendices.....	78
Appendix A- C-Term Trial Graphs	78
Appendix B - Interview Questions	80
Appendix B1- Faculty Member 1 Interview Questions.....	80
Appendix B2 - Faculty Interview questions.....	82
Appendix B3 - Faculty Member 3 Interview Questions.....	83

Appendix B4- Facilities Interview Questions	84
Appendix B5 - Citron Sales Interview Questions.....	85
Appendix C- D-Term Survey Distribution and Response Questions Data.....	86
Appendix D- A-Term Survey Distribution and Response Questions Data	118
Appendix E- Faculty and Staff Interview Table and Summaries.....	126
Appendix E1 - Faculty Member 1	128
Appendix E2 - Interview with Professor 1	129
Appendix E3 - Interview with Professor 2.....	130
Appendix E4 - Interview with Professor 3	132
Appendix E5 - Interview with Professor 4.....	133
Appendix E6 - Interview with Professor 5.....	134
Appendix E7 - Interview with Faculty Member 2.....	135
Appendix E8 - Interview with Faculty Member 3.....	136
Appendix E9 - Interview with Professor 6.....	137
Appendix E10 - Interview with Faculty Member 4.....	138
Appendix E11 - Interview with Professor 7.....	139
Appendix E12 - Interview with Faculty Member 5.....	140
Appendix E13 - Interview with Faculty Member 6.....	141
Appendix E14 - Supplier Interview with Citron Hygiene Sales Representative.....	142

Table of Figures

Fig. 1. C-Term Trial Utilization	26
Fig. 2. Gordon Library Pad Use	27
Fig. 3. Gordon Library Tampon Use	27
Fig. 4. Survey Data Regarding Current Product Usage.....	29
Fig. 5. Survey Data Regarding Free Product Usage.....	30
Fig. 6. Survey Data Regarding Student Product Distribution Preferences.....	31
Fig. 7. Survey Data Regarding Student Product Aspects Preferences	32
Fig. 8. Survey Data Regarding Presentation of Information Preferences.....	33
Fig. 9. Survey Data Regarding Educational Campaign Content Preferences.....	34
Fig. 10. Axiomatic Design for Free Menstrual Program	37
Fig. 11: Interactive Scenario Analysis Tool.....	39
Fig. 12: Economic Ordering Quantity	41
Fig. 13: WPI Custodial Staff Flowchart of Tasks	47

Table of Tables

Table 1. Average Product Usage per Day in Gordon Library from February 6, 2020 - February 27, 2020.....	26
Table 2. Inventory Space Required for Demand.....	48
Table 3. Economic Ranking Criteria	49
Table 4. Investment in Long-Term Business Ranking Criteria	50
Table 5. Social and Environmental Ranking Criteria.....	51
Table 6. Other Ranking Criteria	52
Table 7. Overall Summary Table of Solution Ranking	53
Table 8. Student-Weighted Summary Table.....	61
Table 9. Administration-Weighted Summary Table	61
Table 10. Facilities-Weighted Summary Table.....	62
Table 11. Summary of Costs.....	63

1.0 Introduction

Access to menstrual products is a ubiquitous problem in the United States according to PERIOD, a national organization whose objective is to provide free menstrual products to those who need them (ACUI, 2019). Menstrual inequality is especially prevalent for college students, specifically due to price. Menstrual products are expensive, and usually marked up in campus stores as well (Schumacher, 2014). The average woman spends over \$120 per year on menstrual products, which is a significant expense. Students without access to a car or transportation cannot purchase cheaper options unless they incur additional transportation expenses. Location and product placement of menstrual products is also an issue. Campus restrooms, and other public restrooms, often have machines that accept only quarters for menstrual products which does not make products accessible to students who often do not carry change.

Some colleges have implemented free menstrual product initiatives to solve these problems (Jordan, 2019). For example, since 2018, Harvard University has provided access to free menstrual products in all students' dorms (Berger, 2018). Since 2016, Brown University has implemented free product dispensers in the restrooms of all non-residential buildings (Lasker, 2016). In 2018, Scotland became the first country to offer free menstrual products in every school, university, and college (ACUI, 2019). Access to menstrual products is a dire issue for those that menstruate; in an article by Erica Harp, survey data found by Free the Tampons revealed that a whopping 86% of women reported beginning their period in public without the supplies they needed, and only 8% reported the menstrual hygiene product dispensers in bathrooms were working 100% of the time (Harp, 2019). In addition to a lack of accessibility, college students are simultaneously experiencing financial burden; as recommended by PERIOD, free product initiatives on campuses can mitigate these barriers. PERIOD is a national

organization that is “demanding an end to period poverty and stigma”. PERIOD@WPI is the local chapter that serves the same mission as its parent organization: to educate the community on period poverty and enable access to menstrual products in the Worcester community, including the WPI campus.

The goal of our project was to assess the feasibility of free menstrual products on WPI’s campus and create an implementation plan for WPI. Our team utilized DMAIC, a six sigma process improvement tool, to structure our project. We collected product users’ preferences through multiple surveys and various interviews in conjunction with the data from the C-Term 2019 free product trial conducted by PERIOD. We used this data to simultaneously conduct a feasibility study for WPI and determine demand projections for menstrual products on campus. Using several industrial engineering and business principles throughout our MQP project, including cost-benefit analysis, economic order quantity, axiomatic design, and decision matrices, our team produced multiple solutions for comparison. We discussed feasibility with project stakeholders, and later considered this feedback when developing ranking criteria and constructing the presentation of these comparisons. One key metric our team considered was the cost of the proposed solution, as this was a key metric for success from our WPI Administration stakeholders. By scoring each alternative in a complex decision matrix with determined factors that aligned with the priorities identified by stakeholders, our team assigned values to the alternatives and presented the highest-scoring solution across all stakeholder groups as our final recommended action.

In Chapter 2, we delve into the background on this issue and several of the procedures we used throughout the analysis of this problem. Chapter 3 details how we executed our aforementioned steps in the DMAIC process. In Chapter 4, the data gathered from WPI students,

faculty, and our project stakeholders is described and analyzed. Chapter 5 presents the analysis of the potential solutions and identifies an implementation plan. Chapter 6 provides recommendations on implementing a free menstrual product offering on WPI's campus. Finally, Chapter 7 provides a brief introspection of our experience conducting this MQP.

2.0 Literature Review

In this chapter, we explain the relevance of access to products for students who menstruate, and the relevance of this problem for WPI students. After defining the scope of this problem for our project, we briefly explore existing collegiate initiatives for offering free products both in trial and permanent installations. Finally, we introduce various business and engineering tools that we utilized in our analysis as we developed a list of recommendations.

2.1 Access to Menstrual Products for Students

Access to menstrual products for college students is an increasingly glaring problem in the United States as college students struggle to find cheap and easy options for obtaining menstrual products. One major aspect of menstrual products that makes them inaccessible is the price. The average woman spends over \$120 per year on menstrual products (Schumacher, 2014). Menstrual products are very expensive, and, in campus stores, may even be marked up from the usual price (Schumacher, 2014). College students often do not have access to a car to get off campus to buy them, and therefore have to incur an extra expense of traveling off campus to purchase a cheaper option. The location of menstrual products is also problematic. While some restrooms do have machines to dispense menstrual products, there is usually a cost associated with them: \$0.25, \$0.75, or even \$1.50. Not many students carry around change, so therefore these machines are useless to them. One solution that many colleges are considering is offering free menstrual products to their students in the restrooms on campus.

New York State recently took action focused at a slightly younger level. Governor Cuomo of New York recently enacted The Governor's Women's Justice Agenda, a law that public middle and high schools have to provide free menstrual products in all women's

bathrooms (Governor Andrew M. Cuomo, 2019, para. 1, 6). This law will improve the “reproductive, economic, and social justice for all New York women” by working to remove the stigma surrounding and barriers created for teenage women by menstrual poverty (Cuomo, 2019). Cuomo believes that this law will level the playing field for women in New York, and will hopefully set the precedent for other states and facilities to follow.

2.2 Free Menstrual Products on College Campuses in the United States

Across the United States, students are pushing to secure free products for the members of their communities that menstruate. In addition to negatively impacting young women’s abilities to learn, the stigma against menstrual health has detrimental consequences. Variations of solving period poverty have taken different forms amongst schools throughout the country. As is the goal for these movements, many free trials have resulted in permanent installations of free pads and tampons in women’s, men’s, and gender-neutral bathrooms on college campuses.

Students are taking initiative to have their colleges implement a free menstrual product system on campus (Paquette, 2016). Students at the University of Arizona wrote a letter to their administration asking for free tampons and pads to be offered in every bathroom on campus. A student at Emory University started a petition that gained over 900 signatures in just one weekend, which equates to about 6% of the student body. She discussed the impact that menstruating can have on their education, stating that if a student’s period arrived early, their only option was to walk 20 minutes off campus to purchase menstrual products, which could result in missing lectures or other important activities (Paquette, 2016). Stories like these will continue to propel the movement for free menstrual products to be offered across the country.

2.2.1 Pilot Trial Campaigns

Many free menstrual products campaigns have been introduced by students, but there are varied approaches to trials and implementations. As early as 2017, Cornell University piloted trials of free products in several bathrooms being supplied and funded by the Women's Resource Center, with backing from the Cornell administration (Si, 2017). Much more informally, at Kansas State University (KSU), generous professors don the persona of the "Period Fairy" and supply baskets of products in women's and family restrooms in some of the academic buildings around campus. These product baskets provide necessary products for college students who may not be able to afford products, with the message that "if [someone menstruating] needs something, take something and bring something back when you're able" (Britton, 2019).

At Texas State University (TSU), the charge is being led by female students - the student government vice president and the president of the period poverty awareness club on campus (PERIOD@TSU). Though the goal is the same as at KSU, the cost of the trial is being split between the student government and the university administration (Garcia, 2019). To kick off its free product trial, Boston University installed several dispensers in the restrooms of six university buildings over the summer of 2019. Notably, unlike some of the aforementioned schools, BU included dispensers in the men's restrooms to be inclusive and accessible for all of its students, regardless of what gender they may identify as (Jordan, 2019). This detail, though it may seem small to some, also works to increase the inclusivity of students who do not identify as a woman, but still menstruate.

2.2.2 Permanent Implementations

Several schools have been able to secure permanent dispensers or systems to provide free menstrual products to their respective student bodies. According to Lasker, in 2016 at Brown University, students pushed that products should be provided, because “pads and tampons are essential, not a luxury,” arguing that products have the same demand and necessity as toilet paper. This movement resulted in a program funded by the Undergraduate Council of Students to provide products in non-residential buildings, including men’s and gender-neutral restrooms.

At Harvard University, a male student asked the question: “If the College can provide free male condoms, why can they not provide free tampons?”. He reignited a movement started two years prior to supply free products for those that menstruate. After surveying student interest in having free products provided on campus and working with the administration and facilities staff, dispensers were secured in all Harvard dorms, with many located in gender-neutral bathrooms. (Berger, 2018). Additionally, after a successful pilot program at Northwestern University that lasted the full 2017-2018 school year, the facilities department implemented a permanent and free program. According to a facilities newsletter, the initial dispenser installation costs were covered by the Northwestern Associated Student Government, with projected net-neutral operating costs for the school (Northwestern Facilities, 2018, para. 4).

Campaigns have varied between states, within both public to private institutions, and been led by students, faculty, and administration alike. Variations and combinations of funding, as well as implementation costs and plans for these programs have shown how many ways the goal of mitigating collegiate period poverty and bringing a more realistic sense of equality to campuses is attainable and implementable at any school.

2.3 PERIOD The Menstrual Movement

PERIOD is a national organization “demanding an end to period poverty and stigma”. The organization focuses their efforts within three branches of activism: service, education, and advocacy. Overall, PERIOD’s mission is to spread awareness of the financial struggles that individuals may experience when purchasing menstrual products, which are generally overpriced and possibly inaccessible, educate the public on the necessity of accessible menstrual products, and advocate for the availability of menstrual products for every individual who needs them. The organization serves their community through national petitions, protests, and by initiating menstrual product distribution to those who do not have access to them. Additionally, PERIOD hosted a fundraising gala, State of the Period, and created National Period Day in 2019 to bring awareness to their cause. There are over 600 PERIOD chapters across the United States, including one chapter on Worcester Polytechnic Institute’s campus, PERIOD@WPI (PERIOD).

PERIOD@WPI’s mission is to educate the WPI community on period poverty, with efforts to provide access to menstrual products to the Worcester community, as well as to the WPI student body. PERIOD@WPI shares its goals and motivations with PERIOD as a national organization, but by creating smaller chapters across the country, individuals are able to better help their local communities directly. PERIOD@WPI was officially recognized as an official WPI club in the spring of 2019 and currently has about 30 members. In the past, the club has hosted menstrual product drives on campus and created period packs, containing enough menstrual products for one average period, for members of the homeless community in Worcester. Additionally, the club recently started a free menstrual product initiative for WPI’s campus. PERIOD@WPI has been able to effectively serve and introduce awareness regarding menstrual inequality to WPI’s campus and the Worcester community.

2.4 The Relevance of Menstrual Poverty on WPI's Campus

Currently, WPI provides access to menstrual products only through outdated product dispensers in women's bathrooms. These machines are outdated as they only accept quarters, which are seldom carried by students, and many are not working. Products are also offered at WPI Health Services, but this provision is not adequately advertised to students. The menstrual product dispensers only accept quarters and further drive up costs for individuals to receive necessary products. This creates three major problems for WPI's student body: accessibility, availability, and affordability.

There is a lack of access to products for students in the LGBTQ+ community that menstruate, but who may not want to use or feel comfortable using a women's restroom. Few students regularly carry coins with them, and therefore, the majority of the menstruating population does not use the product dispensers, according to PERIOD@WPI. Additionally, these dispensers are few and far between on WPI's campus; dispensers are not available in every women's restroom on campus. There are only 28 machines found on the entirety of WPI's campus. Furthermore, menstrual product dispensers may not reliably exist in residential buildings' bathrooms either. Additionally, WPI incurs the significant cost of \$8,600 per year with their current method of distribution: providing menstrual products through dispensers that are restocked by Citron Hygiene, a third-party vendor. This cost accounts for the bi-weekly restocking of the 28 machines on WPI's campus (T. Pellerin, Personal Communication, April 16, 2020). These dispensers are also widely underutilized by the student body, as determined by about 85% of our team's survey participants, begging the question of whether or not the expense of a third-party vendor is worth it, and if these costs could be better allocated to offering free products.

2.4.1 WPI's Efforts in Product Provision

In the past, WPI has made some effort to alleviate the inaccessibility of menstrual products for WPI's campus, namely the correction of discrepancies between dispenser pricing: products are now consistently \$0.25 across campus. However, this does not eliminate the issue of needing coins in exchange for the products. Additionally, since the construction of the new Foisie Innovation Studio WPI's campus in 2018, it was ensured that product dispensers would be available in every restroom in the building, and all new buildings going forward. The past efforts WPI has put forth to decrease the menstrual inequality on campus are steps in the right direction, but there is still work to be done to eliminate menstrual inequality.

2.5 Background on Methods

Before delving into our proposed methodology, we provide a brief background on several methods and concepts we utilized for data collection and analysis in our project.

2.5.1 WPI Free Product Pilot Program

With the support of Dean of Students, Emily Perlow, PERIOD@WPI conducted a trial of free menstrual products for students in C-Term of 2019. Products were initially placed in three gender-neutral restrooms on campus over the seven-week term with the goal of gaining a sense of product utilization in these bathrooms. The student volunteers recorded the amounts of pads and tampons daily. By tracking the usage of products daily over A-Term, the organization hoped to demonstrate that students would appreciate, and not abuse, the provided products, therefore strengthening their argument that WPI should provide free products for its menstruating students, faculty, and staff. The expansion to women's restrooms in a non-residential building was discussed, but due to the COVID-19 outbreak, this expansion could not be implemented

2.5.2 Surveys

Hubspot Marketing experts explain that in order for a survey or questionnaire to be successful, it must be clear, concise, and have a goal (Amaresan, 2019). It is extremely important to be detail-oriented when making surveys so as to not show bias or confuse the survey participants in any way (Pew Research Center, 2020). More specifically, using easy to understand vocabulary and explaining any questions that may seem intrusive or make any participants uncomfortable can make the survey-taking experience more enjoyable (Amaresan, 2019). Hubspot expert claims that “survey design is extremely important as it can make or break the survey’s completion rate” (Amaresan, 2019). Experts at the Pew Research Center explain that the use of open-response questions should be strategic in the survey as participants are more likely to respond to close-ended questions (Pew Research Center, 2020). Most importantly, every survey should be tested and retested before being sent out to the target audience (Amaresan, 2019; Pew Research Center, 2020).

2.5.3 Axiomatic Design

In an effort to find the optimal project solutions, our team used axiomatic design, a problem-solving tool that focuses on customer requirements, functional requirements, design parameters, and process variables (Suh, 1998). Axiomatic design identifies the design domains and aids in developing the structure of a design. Customer requirements are the components of a design that adds value and fulfills customers’ needs. Functional requirements are the details that explain the purpose and function of the design. Design parameters illustrate the visual layout and structure of the design. Process variables detail how the design is created and finalized. We used

these axiomatic design principles when executing our inventory analysis and the restocking process used by WPI's Facilities Office employees.

2.5.5 DMAIC Methodology Structure

DMAIC is a process improvement tool that stands for Define, Measure, Analyze, Improve, and Control (The Define, Measure, Analyze, Improve, Control (DMAIC) Process, 2020). "Define" is the step where the problem is identified. "Measure" and "Analyze" are the steps where data from the process is analyzed for patterns. "Improve" includes the development of new methods or processes for the system. Finally, "Control" assesses sustainability; it is imperative that the determined solution is feasible for perpetual use.

- Define: problem identification
- Measure & Analyze: analysis of process data for patterns
- Improve: development of new methods or processes for the system
- Control: assess sustainability for perpetual use

The DMAIC structure can be applied to any process to eliminate inefficiencies, defects, and to improve the overall process. Our project follows the DMAIC format to ensure that the inefficiencies of WPI's current menstrual product distribution system are properly identified and are reformed in a way that is suitable for future use at WPI.

2.5.6 Decision Analysis Tools

In order to effectively evaluate alternatives and develop recommendations that create value, our team chose to employ a decision matrix in conjunction with ranked criteria. The goal behind using these analysis tools together was to effectively present a comparison of our various solutions by evaluating the different aspects that affect decisions for our stakeholders. Significant factors are identified throughout the data collection portion of a project and then categorized to

create an established list of ranked criteria. The possible scoring within each factor is assigned to evaluate all relevant parts of a potential solution. Scoring sections are explained thoroughly to most accurately rationalize scoring. By presenting data in a decision matrix, weights can be applied to each criterion to create a cumulative score for each alternative, providing an easy way to identify the highest scored solution. Additionally, stakeholders can explore how a change in the value of criteria weights affects a solution's score. For example, WPI may note that cost is the factor that will most affect their decision. The weight for all economic factors can be changed to reflect this and will interact dynamically with the scores for each economically-categorized factor.

2.6 Conclusion

There is a clear need for WPI students to have access to free, easily accessible menstrual products. Our MQP team worked with PERIOD@WPI and Dean Perlow to assess the feasibility of implementing an initiative for access to free menstrual products in WPI restrooms. The success of this initiative will improve the public welfare and health of WPI students, while also benefiting WPI economically. In the next chapter, we explain the objectives that we follow in order to achieve this goal.

3.0 Methodology

The lack of access to menstrual products is a complex engineering problem, as it is multidimensional and has no straightforward solution. The goal of our project was to assess the feasibility of free menstrual products on WPI's campus and create an implementation plan for WPI. More specifically, the range of aspects to be considered include the potential impact on WPI custodial staff's schedule and inventory, WPI's budget, and the role, if any, of a third-party company in the procedure. To accomplish this, our team developed the following objectives following the DMAIC format:

Define: Understand the Opportunity for this Project and the Precedent at Other Schools

Measure: Identify Campus Opinions Related to Menstrual Product Provision

Analyze: Utilize Scenario Analysis Tool to Evaluate Menstrual Product Program Alternatives

Improve: Select Preferred Menstrual Product Program

Control: Develop an Implementation Plan to Sustain Preferred Menstrual Product Program

By analyzing WPI's current practices and demand levels regarding menstrual products, our team was able to more definitively identify all aspects of this issue. In order to create a list of recommendations, we utilized industrial engineering and business analysis tools, surveys, and personal communications to define the campus needs and opinions, as well as opportunities for improvement and innovation.

3.1 Understand the Opportunity for this Project and the Precedent at Other Schools

To fully understand the opportunity and need for menstrual products on WPI's campus, research on previous initiatives was conducted in our literature review, as well as interviews with Dean Perlow and PERIOD@WPI. The research conducted in the background section allowed the team to develop a comprehensive understanding of previous free menstrual product initiatives and insights about potential implementations for consideration.

3.1.1 Interviews with PERIOD@WPI and Dean Perlow

Over the course of C and D-Term, our team conducted interviews with Dean Perlow and PERIOD@WPI to understand the opportunity to reform WPI's menstrual product distribution system, the need for this change due to menstrual inequality, and WPI's past efforts in decreasing menstrual inequality.

3.1.2 Measure Campus Need and Demand

To accurately determine the potential level of impact free products would have on the WPI campus, our team analyzed feedback from the C-Term pilot program to assess utilization rate and create a comprehensive survey to gauge the interest of a larger portion of the student body, including individuals who do not menstruate.

PERIOD@WPI provided a spreadsheet of data indicating the number of menstrual products (pads and tampons) in each restroom throughout the trial. Please find the graphic analysis of this data in Appendix D. Through a graphical analysis, we were able to better understand the restocking that was done in each restroom of each product, and therefore estimate the demand for products. Due to the nature of several different individuals recording information, as well as the fact that we utilized data we did not collect, our team considered the human error associated with the data. Our team had hoped to initiate a second round of trialing during A-Term with more specific and consistent data collection methods, however, there were several barriers due to COVID-19 (lower number of students on campus, occupancy restrictions on buildings and heightened precautions regarding sanitation) that prevented this from occurring.

3.2 Identify Campus Opinions Related to Menstrual Product Provision

After conducting preliminary interviews, our team designed two student surveys. These surveys measured students' opinions and need for menstrual products on campus. Additionally, our team utilized in-depth interviews with faculty to better define campus interest and to identify the need for changes to the menstrual product distribution system that our survey might have not allowed for. Interview questions were modeled as open-ended versions of those included in our survey, especially questions regarding WPI faculty awareness and opinions on the C-Term free product trial. Interviews were designed to be 15-20 minutes and presented in a conversational manner. Our team asked for opinions regarding the permanent implementation of a free menstrual product distribution initiative. Please see faculty interview questions in Appendix B.

3.2.1 Menstrual Product Campus-Wide Surveys

In D-Term 2020, our team created a survey to gauge the understanding and involvement students had with the previous free menstrual products trial, as well as weigh the potential for involvement in the future project. For A-term survey questions and results, please see Appendix C. The survey questions assessed students' awareness, participation, support, and need for free menstrual products on WPI's campus. To allow for a more flexible survey experience, the survey was created using the service Qualtrics. For example, if the respondent answers "no" to Question 2: "Are you a person who menstruates?", the survey skips all questions pertaining to users of menstrual products and populates with general questions regarding the respondent's support of this initiative on campus, or if they have any suggestions.

The survey was distributed to 31 campus organizations, approximately 2,500 students. A table of the organizations that received this survey can be seen in Appendix C. This final number

of students is estimated based upon the number of students in each organization and does not consider any overlap between students who may be involved in multiple organizations on campus. Because of this, the total number of recipients is likely much lower than estimated.

In A-Term 2020, we released a new survey that allowed us to gain insight on what is most important to WPI students regarding menstrual products as well as some information about a potential educational campaign surrounding menstrual poverty and menstrual products on WPI's campus. Please see Appendix D for the survey questions and results. These survey questions defined WPI students' priorities and preferences for a free menstrual product program and educational campaign for the university's campus.

The survey was distributed to 27 campus organizations, approximately 2,000 students. A table of the organizations that received this survey can be seen in Appendix D. Like the first survey distributed, the final number of students receiving the survey is estimated based upon the number of students in each organization, which does not consider any students who may be involved in multiple organizations on campus or students who may have graduated in Spring 2020 and are still on the organization roster. Because of this, the total number of recipients is likely much lower than estimated.

Surveying peers regarding menstrual product accessibility and the C-Term pilot program facilitated our understanding of current campus demand for products to use in our assessment of recommendations. It is important to note that due to the time constraints of the project, the students surveyed were a convenience sample. To distribute our survey, our team reached out to the executive board aliases, requesting that they further distribute our survey to their club or organization. We focused on clubs whose membership is predominantly women or who may have members who menstruate. However, as this project affects the university budget and

therefore may affect the population of campus that does not menstruate, we sent our survey to the president of the Interfraternity Council to distribute to the fraternity presidents. We did not anticipate getting many responses from this demographic but wanted to open it to the largest male organization on campus. Additionally, we were able to reach a small number of graduate women as well.

3.2.2 Identify Faculty and Staff Interest and Attitude

Our team understood that the issue of product accessibility extended past the student perspective and potentially affected other members of the WPI community, including faculty and staff. As members of the WPI campus for longer than the typical four-year student, our team valued a wider range of inputs by interviewing faculty and staff of different backgrounds, ages, and genders. As with the student-oriented surveys, our team conducted semi-structured interviews with WPI staff and faculty to gauge their support and understanding of this initiative. When combined with the feedback from students, our team was better able to understand the scope of the trial that was conducted in C-Term of 2020.

Over the course of D-Term, our team contacted faculty and staff in different departments via email to schedule Zoom interview calls during D-Term 2020. Though random samples would likely have given us a statistically accurate view of campus opinions, our team decided that convenience sampling would be the most cohesive method of securing interviews with regards to the social distance status of D-Term and A-Term 2020. Members of our team reached out to professors that we had connections with and anticipated having availability to participate in these interviews. The list of interviewees included individuals who do and do not menstruate in order to obtain the views and opinions of both groups. The list of interviewees and their titles can be seen in Appendix E. It is important to note that the conversation often deviated from our script,

which allowed us to gain new ideas and topics regarding free menstrual products on campus that we had not previously considered. All interviews are summarized in the sub-appendices in Appendix E.

3.3 Utilize Scenario Analysis Tool to Evaluate Menstrual Product Program Alternatives

We applied the principles of axiomatic design and conducted a process analysis of the existing procedures of the WPI custodial staff, as well as assessed constraints for implementation of a free menstrual product initiative. We identified inefficiencies and pain points in the existing procedure with the third-party company. Currently, WPI pays a third-party to service the menstrual product dispensers on WPI's campus. Our team worked with Terrance Pellerin, the Associate Director of WPI Facilities, to better understand the current system in place with the third-party vendor, Citron Hygiene. Our team explored the current costs associated with purchasing menstrual products from the vendor, with the goal of exploring whether the elimination of this contract could save WPI money. Ideally, we wanted to be able to combine basic budget analysis with information from WPI's custodial staff on the current dispenser utilization rate to determine the cost per item with an out-sourced company refilling these dispensers. After speaking with Citron Hygiene, we found that this was not possible because Citron Hygiene does not track menstrual product usage.

As our team explored potential solutions for this project, we identified an organization called Aunt Flow, which works as a subscription service to bring free products to companies and schools. As an alternative to the current process, the WPI Facilities Office would order and install touch-free machines from Aunt Flow and restock products as-needed. Our team envisioned that restocking would occur during the times when custodial staff clean and restock other toiletry products in the bathrooms around campus during their daily roles. The products

provided by Aunt Flow are 100% cotton, organic products and for every pack of menstrual products that they sell, Aunt Flow donates 500 menstrual products to the national group, PERIOD (Nixon, 2020).

In addition to solutions that would replace the operations on campus, our team considered alternatives that posed little change to the current processes and instead, modified existing campus resources, such as WPI Health Services, to offer free products to students. Our team contacted WPI Health Services to inquire if this was something that was already offered and to gain an understanding as to whether this alternative could be viable.

Through our discussions with the WPI Facilities Office and Dean Perlow, our team developed methods and tools to analyze potential menstrual product programs for WPI. After performing these analyses, our team selected the best alternative to create recommendations for implementation. To tie this information together, our team developed an interactive scenario analysis tool in Excel, accompanied by models of several potential solutions for our stakeholders to consider. The industrial engineering and business principles utilized within this scenario analysis are detailed in the following sections.

3.3.1 Scenario Analysis

In order to analyze and compare different alternatives, our team created an MS Excel spreadsheet scenario analysis tool. This scenario analysis includes data, such as cost, labor, and ordering schedules and was created with embedded MS Excel formulas. Once our team developed the scenarios for testing based on our interview and survey data, we input the data related to each scenario to produce the output data. This interactive scenario analysis can be utilized in the future by WPI decision makers for the free menstrual product initiative.

3.3.2 Cost Analysis

Our team conducted simple analyses of the cost associated with continuing to work with Citron Hygiene, the existing third-party menstrual product distributor, the cost of adopting a new company, Aunt Flow, and the cost for WPI Health Services to distribute products to students. Through our interviews with Dean Perlow, our team determined the budget for the current menstrual product provision on campus, led by Citron Hygiene. Our team also met with a representative from Aunt Flow to gain insight on the cost breakdown of Aunt Flow's products and determine any overhead or additional expenses that would need to be considered. Finally, we contacted WPI Health services to understand their budget to distribute free products. Our team analyzed WPI's current budget allocation to determine a cost-effective approach that is mutually beneficial to both WPI and its students.

3.3.3 Process Analysis

As previously discussed, WPI currently partners with Citron Hygiene to service the menstrual product dispensers. Our team expected that there would be time in the WPI custodial staff's schedules to add the additional task of replenishing menstrual products in bathrooms that would be obtained from Aunt Flow. Due to the COVID-19 pandemic, we were unable to analyze these processes for inefficiencies and non-value-added time to determine if there is leniency in the custodial staff duties to include the restocking of product dispensers. Our team also explored the cost associated with WPI housing menstrual product inventory. Currently, Citron Hygiene houses product inventory and handles the restocking and servicing menstrual product dispensers.

Since WPI Facilities is able to always have toilet paper restocked and available to all students, our team hypothesized that the custodial staff would be able to also consistently restock

menstrual products as well. Our rationalization considered that twice as many students use toilet paper, since it is used more consistently and frequently than menstrual products.

After our conversation with Ronald O'Brien, Director of WPI Facilities' Operations, our team estimated the process timing, materials, and labor requirements with an aim to provide the WPI Facilities Office with a flowchart of complete processes for implementation. We were also able to discuss the feasibility of each alternative that our team developed in order to better understand how each new alternative that we present may affect the WPI Facilities Office's operations. Our team had originally planned an in-depth analysis of the WPI custodial staff's schedules and processes, but the changes on campus from COVID-19 did not allow for this analysis to occur. In place of this, our team developed a flowchart based on assumptions from our existing knowledge and conversation with Ronald O'Brien.

3.3.4 Inventory Analysis

If the WPI custodial staff were to take on the responsibility of distributing menstrual products, our team hypothesizes that it would resemble WPI's inventory storage and stocking processes for toilet paper, hand soap, and paper towels. We also determined the economic order quantity of the menstrual products to ensure that the materials are handled in the most efficient and cost-effective way possible, based on the results from the survey and current menstrual product demand on campus. Industrial engineering principles related to materials management are an imperative component of this potential solution and were considered in this step.

3.3.5 Evaluating Potential Solutions

In order to assign meaning to the evaluations of our various solutions, our team generated a series of criteria to rank each solution against. The criteria were selected based on previous

concerns WPI stakeholders raised regarding this initiative, such as cost and impact on existing processes. As we gathered factors that were important in our stakeholders' decisions, our team created four criterion categories: Economic, Investment in Long-Term Business, Environmental/Social and Other. For initial purposes, we set each of these four categories at the same weight (25%), however this can be changed based on feedback from WPI Facilities and Dean Perlow if any of these categories have a larger impact on the final decision.

3.4 Select Preferred Menstrual Product Program

Based on the analyses completed in the feasibility analysis, our team developed alternatives for WPI's menstrual product distribution system that considers time, facility staff schedules, inventory, cost, and demand.

All of the initial analysis was conducted with an assumption of equal weighting across all four criteria categories. However, throughout our team's analysis of the data we collected from our two student surveys and our interviews with WPI faculty, Dean Perlow, and President Laurie Leshin, our team found that stakeholders assigned more weight to individual criteria categories in accordance with what they deemed was most important about an implementation of free products. In an effort to illustrate this, our team created two additional reconfigurations of our decision matrix, adjusting the weights for the decision criteria to better serve the needs of each stakeholder group. When changing these weights, we gave the most important category a weight of 40%, then weighted the remaining three categories at 20%. This accounts for a certain level of importance of the other categories, but very clearly illustrates the prioritized criteria of each stakeholder group.

3.5 Develop an Implementation Plan to Sustain Preferred Menstrual Product Program

Based on our previous discussion with WPI facilities staff and a sales representative from Citron Hygiene, our team identified ways to ensure that the proposed menstrual product distribution system is feasible and sustainable for WPI. Our team presented our recommendations to Dean Perlow, Sharon Johnson, and PERIOD@WPI and provided our data, WPI custodial work flow analysis, and scenario analysis models as a supplement for a proposal to integrate free product testing into the budget for the 2022-2023 school year. Additionally, we hosted regular meetings with PERIOD@WPI to discuss updates as well as a transition meeting with PERIOD@WPI and our team's Aunt Flow representative to create a relationship between the two parties. The longevity of this project and the eventual implementation of this plan relies on a transition between our team and PERIOD@WPI. In the next chapters, we explore potential solutions through an assessment of our findings.

4.0 Market Input

After conducting surveys and interviews with WPI's students and faculty, our team identified overwhelming support for free menstrual products being available on campus. Students and faculty indicated a need on campus and the urgency behind it. One quote from a WPI professor demonstrates the passion for not only creating a more inclusive campus, but also emphasizing the importance of equity between students of all gender-identities on WPI's campus:

“What [women and those that identify as women] have been taught to do, what we've been enculturated to do, is to just stay quiet as possible. Don't question our presence here, let's just be grateful, let's just go with the flow, as opposed to 'hey, no, we're here and we're a vital part of this community and we should be included and respected. We're not asking for anything that anyone else doesn't get, but we are *asking* for what everyone else gets. And so, I think this is a great way of saying 'hey, no, we're here and we deserve equality in all its different iterations'” (Professor 2, Personal Communication, April 20, 2020).

This chapter discusses the results from the survey sent out to students and interviews conducted with faculty in detail, as well as the analysis conducted on the C-Term free product trial.

4.1 Free Product Trial Data Analysis

In C-Term of 2020, PERIOD@WPI conducted a free menstrual product trial on campus. For accessibility purposes, three gender-neutral bathrooms were chosen as sites for free products to be provided. Figure 1 shows the trial's utilization over C-Term. The spike in products to approximately 150 on February 7th occurred because of an increase in product distribution in Gordon Library. PERIOD@WPI had extra products as the end of the term neared and decided to expand the trial to the gender-neutral restrooms on all three floors. As a result, the utilization rates rose for the remainder of the trial.

Product Utilization over Time

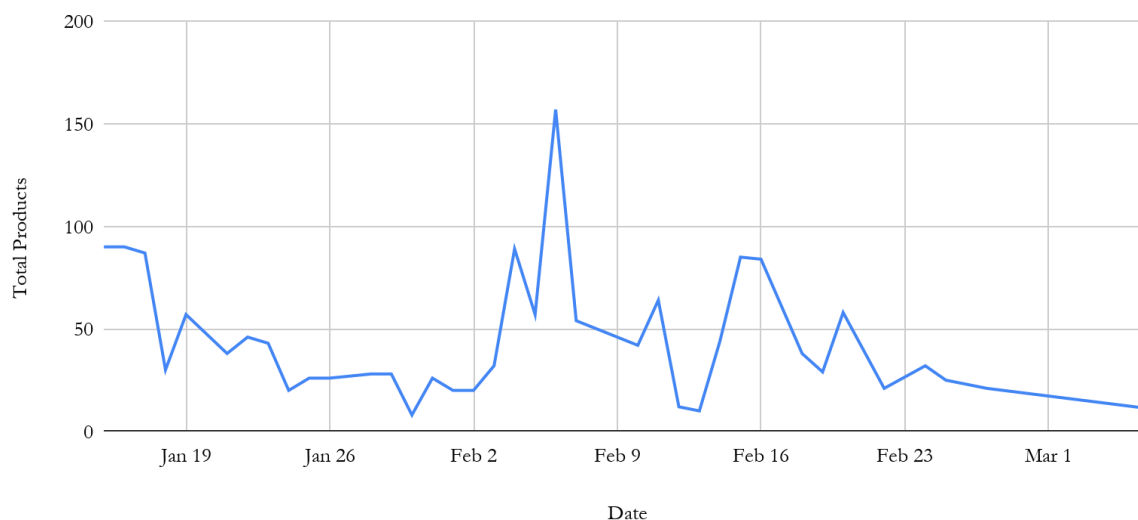


Fig. 1. C-Term Trial Utilization

Figures 2 and 3 illustrate the product use for pads and tampons. Increases on the graph indicate restocking that occurred in the restroom. From these graphs, our team identified that the second-floor restroom has a high pad utilization rate, followed by the third floor. The products in each of these bathrooms were almost completely used within a week. Tampons were used most quickly in the first and second floor restrooms. Our team does not have access to library traffic patterns, but it is important to note that the second floor is the main floor of the library, which could explain high usage on this floor for each of the products. In table 1, the average pad and tampon use per day per library floor is outlined and is estimated to be about 1 product per day.

Table 1. Average Product Usage per Day in Gordon Library from February 6, 2020 - February 27, 2020

Gordon Library Floor	Average Pad Usage/Day	Average Tampon Usage/Day
Ground Floor	0.92	0.76
First Floor	0.84	0.72
Second Floor (Main Floor)	0.72	0.74
Third Floor	0.74	0.67

Gordon Library Pad Use

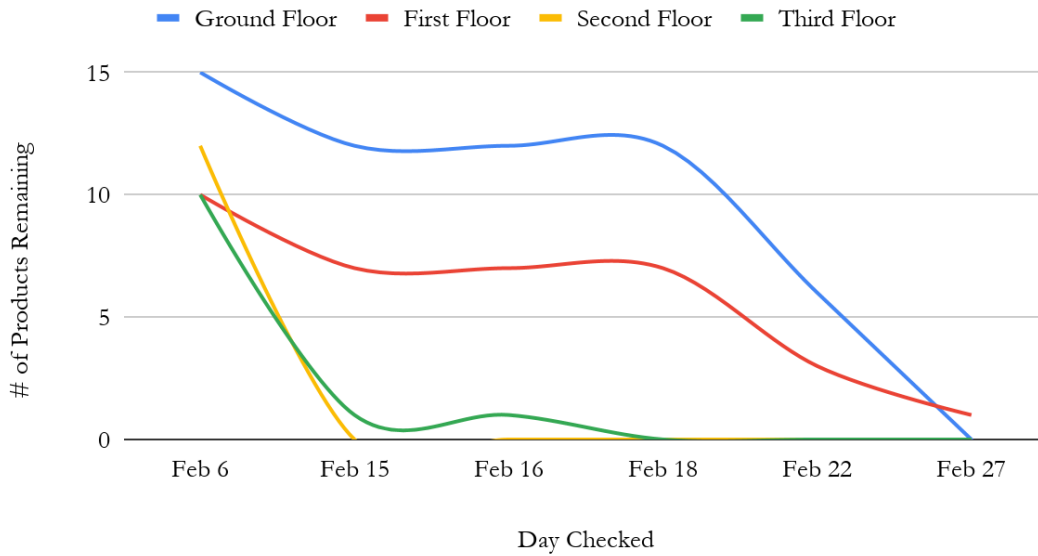


Fig. 2. Gordon Library Pad Use

Gordon Library Tampon Use

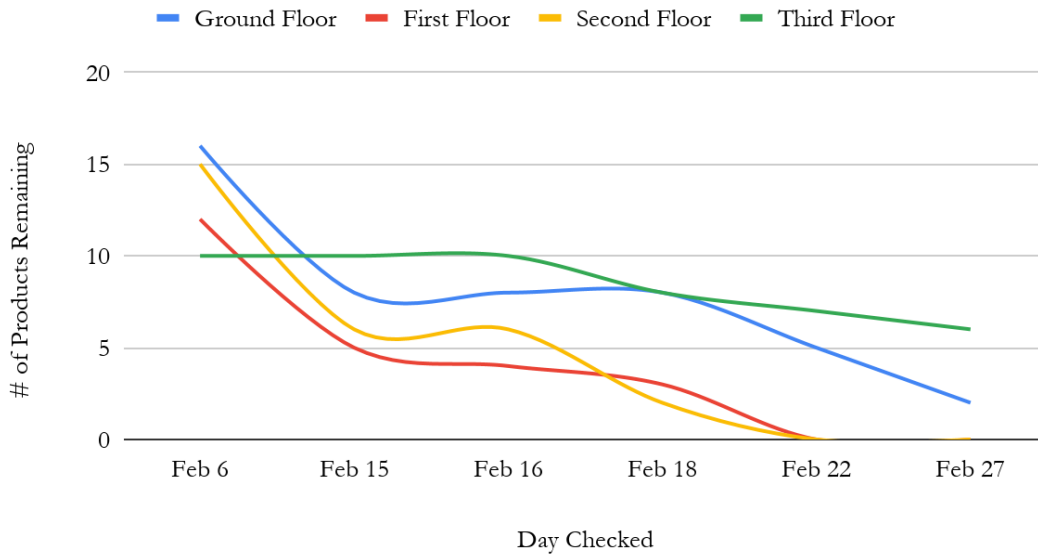


Fig. 3. Gordon Library Tampon Use

While the numbers show a relatively consistent utilization rate, there were several external factors that had to be considered in addition to our statistical analysis. Recorded data shows that the supply in the bathrooms were not checked every day, and the time of day when

data was recorded fluctuated. Some bathrooms were recorded at the beginning of the day, while others were recorded in the middle of the day or at night. Additionally, supplies were not restocked when a product was first reported as depleted, leading to the loss of potential data. As this trial was positioned in gender-neutral bathrooms, our team assumed that utilization rates would be much higher in women's restrooms as gender-neutral restrooms may not see as much traffic. This trial did not ask for any information on participants and thus, our team cannot verify how many unique or repeat users participated in the trial. Given these two limitations, our team could not be sure how accurately these results represent the needs and utilization of the entire university.

4.2 Survey Analysis

Both surveys that we designed were distributed to multiple organizations on campus that represented our target audience, individuals who menstruate, as well as organizations that allowed individuals outside of our target audience to share their opinions as well. We chose to send this survey to all of Greek life at WPI, the largest group of students - both men and women - on campus, as well as many women's organizations and organizations that represent members of the LGBTQ+ community. This allowed our survey to reach a diverse group of individuals.

We sent the D-Term survey to 2,456 people, using the mailing lists for the WPI organizations we identified. As described in the methodology, this estimate does not consider any overlapping between students who are involved in multiple organizations on campus, and therefore is an overestimate. The survey was open for 9 days. From this distribution, we were able to collect 317 responses for our D-Term survey, which is about a 13% response rate.

For the A-Term survey, we estimated that 1,965 students received the survey through 27 campus organizations. Again, this estimate is based upon the number of students in each

organization and does not consider any student overlap between organizations on campus. We had the survey open for 5 days due to our accelerated timeline and the nature of the information our team sought to collect, and managed to gather 101 responses from students, amounting to a response rate of about 5%.

4.2.1 D-Term Post-Trial Survey Results

The objective of the first survey we distributed was to gauge demand projections and knowledge of the C-Term trial, as well as to begin to understand user input with regards to product provision. We considered that low demand in the C-Term free product trial indicated low trial awareness, and high demand indicated users were taking advantage of the program. We also used the data regarding the product demand to draw conclusions about the need for this program's implementation. One key analysis from our survey was the potential utilization of the free products on campus. The response to question 7, as seen in Figure 4, indicated that the majority of respondents rarely or never utilize the current dispensers on campus, emphasizing product inaccessibility due to either price or location, as previously discussed.

Q7 - How often do you use the menstrual product dispensers in the bathrooms on campus?

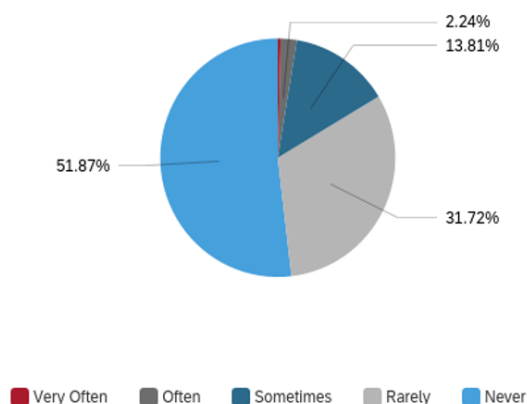


Fig. 4. Survey Data Regarding Current Product Usage

As seen in Figure 5, many of the respondents indicated that they would be likely to use the products if they were offered for free, supporting that low utilization of the existing dispensers may be driven by the inconvenient cost of \$0.25.

Q5 - How likely are you to utilize free menstrual products in WPI's bathrooms?

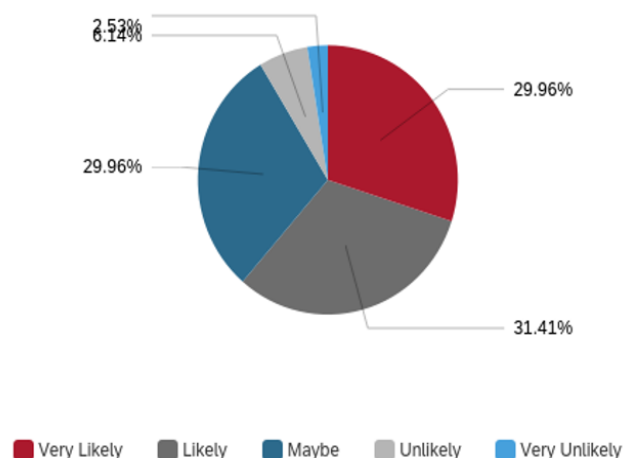


Fig. 5. Survey Data Regarding Free Product Usage

In the free response section, many students voiced their visions for free product provision on campus. One student stated that “widespread implementation would be needed. very few bathrooms had free products. coins are hard to come by, so that's a barrier for usage. Advertise a lot more please” which substantiates the low awareness of the C-Term trial. and the importance of education regarding free product offerings. With regards to free product placement, another student suggested “maybe put them in a dispenser like the ones for paying but not have people pay for them, so people don't over use.” This comment urged our team to focus on alternatives that did not utilize open baskets on bathroom counters. Please find our full survey results in Appendix C.

4.2.2 A-Term Opinion Survey Results

The goal of this survey was to identify WPI students' opinions on the potential distribution methods for menstrual products, the attributes of menstrual products that were most important to them, and the potential for education regarding menstrual poverty.

When asked to rank the different methods of menstrual product distribution, the highest ranked choice was touch-free dispensers, as shown in Figure 6 below. This contactless method of distribution aids in the new considerations WPI must make during the COVID-19 pandemic, as well as extending into a future of hyper-focus on safety regarding shared surfaces, especially in restrooms. Respondents indicated that the existing method of distribution through machines costing \$0.25 was the least desirable option.

**Please rank these options regarding menstrual product distribution
(1 = most desirable, 4 = least desirable).**

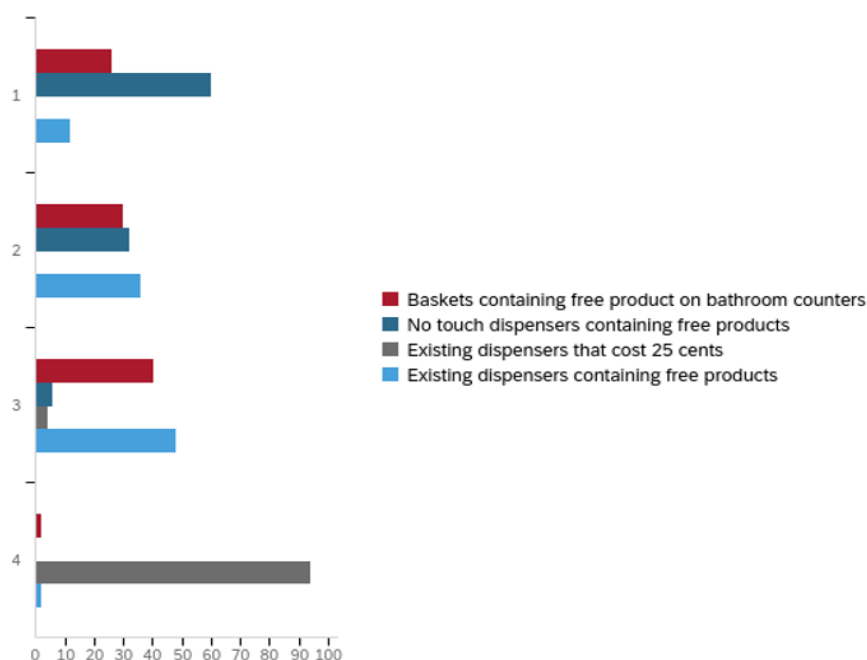


Fig. 6. Survey Data Regarding Student Product Distribution Preferences

Respondents indicated that the most important attribute of menstrual products on campus is that they are free, as our team hypothesized (see Figure 7). This data helped our team

understand that our respondents place the highest value on product cost, rather than brand recognition or eco-consciousness, all of which were repeatedly identified factors from the free response section of our D-Term survey. In light of these responses, our team focused mostly on providing solutions with free products. If our team was able to find a solution that involved more environmentally-friendly products, this would result in more satisfaction from our stakeholder group of menstruators.

Please rank these choices regarding menstrual products in order of importance to you (1 = most important, 3 = least important).

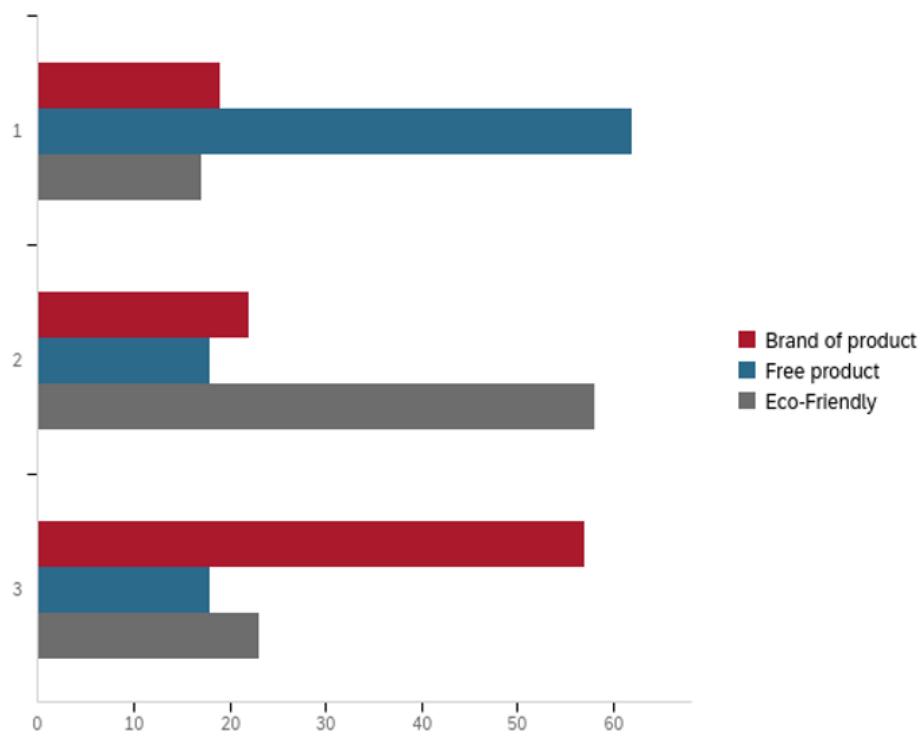


Fig. 7. Survey Data Regarding Student Product Aspects Preferences

Our team identified a menstrual education campaign on WPI's campus to be a potential method of increasing awareness of menstrual poverty, especially indicated through responses from the D-Term survey results. Respondents to the A-Term survey indicated that the most desirable way to obtain this information would be through flyers in bathrooms, as shown in Figure 8.

How would you like to be presented information regarding menstruation? Rank from (1 = most desirable, 3 = least desirable)

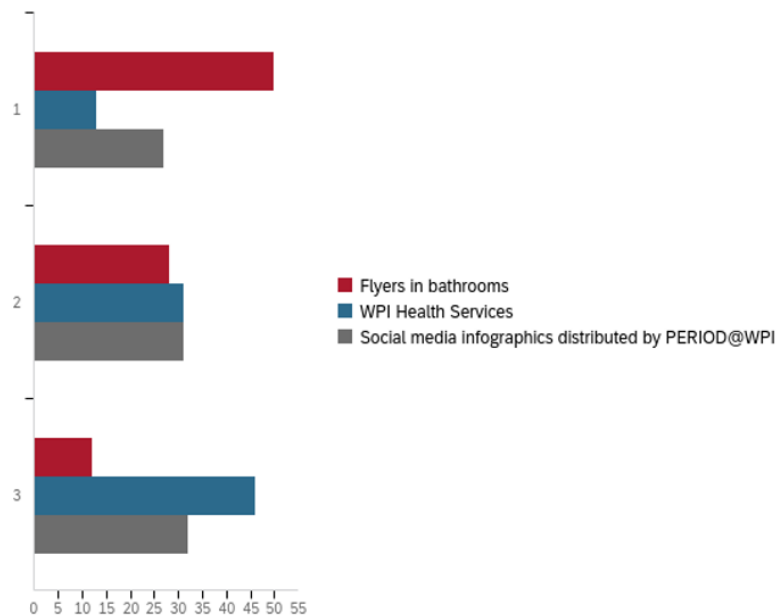


Fig. 8. Survey Data Regarding Presentation of Information Preferences

When asked what type of content would be best for an educational campaign, the highest ranked option was information on the locations of menstrual products on WPI's campus (full summary of results in Figure 9). This indicated that students do not know where to find menstrual products on campus if they are needed, which demonstrates that further education provided by WPI is necessary. The next highest ranked option was statistics and current events on menstrual poverty. This indicates that respondents have low awareness of the struggle many college students have for obtaining menstrual products.

**What would you like to see from an educational campaign regarding menstruation?
Check all that apply.**

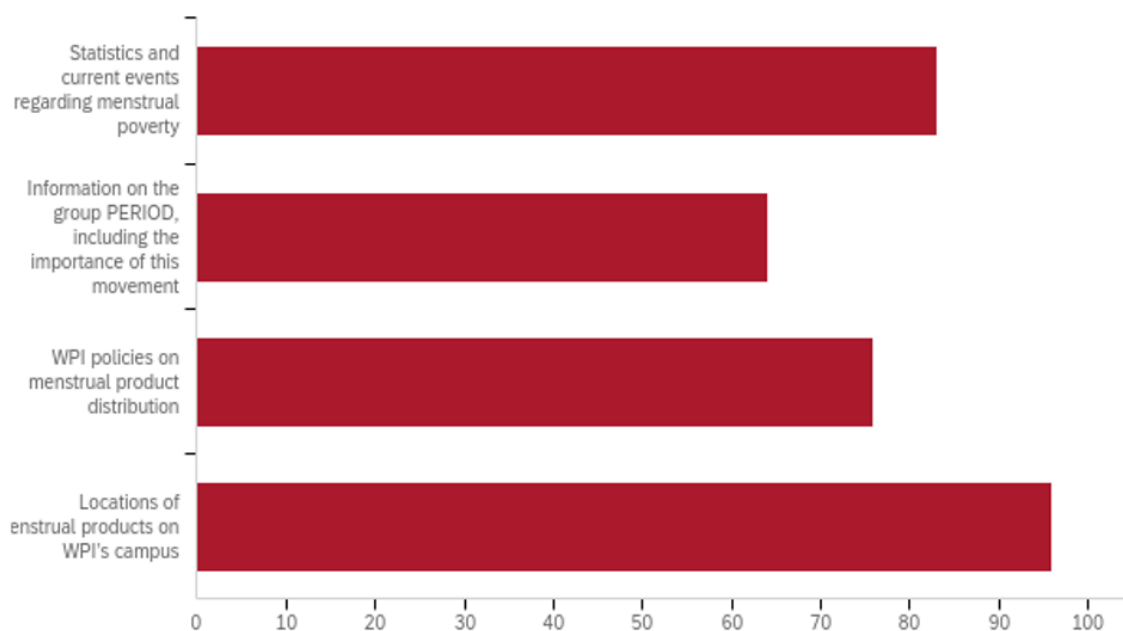


Fig. 9. Survey Data Regarding Educational Campaign Content Preferences

4.3 Interview Results

Interviews with faculty were informative on WPI's non-student opinions on menstrual equality on campus. Summaries of each of our faculty and staff interviews can be found in Appendices F1-14. The overwhelming sense from the 14 interviews conducted was immense support. Our team conducted 10 faculty interviews, one project analysis interview with Dean Perlow, one interview with President Leshin, one interview with Terry Pellerin, the Associate Director of Buildings & Events within the WPI Facilities Office, and one interview with Citron Hygiene, the third-party company WPI works with. One faculty member noted that this is a “phenomenal initiative and it will make WPI a more inclusive community”, and another noted that his initial thought was “Why wouldn't menstrual products be free on campus?”

Many faculty members noted that they would not use the free products regularly, but they would if it were an emergency. One interviewee identified a time where her menstrual cycle

began earlier than anticipated, and she utilized a free product offered in the recreational center. The situations and considerations that these interviews presented helped to inform our final recommendations. The information gathered during the interviews was used to revise and improve our factor considerations when creating the ranking criteria categories.

4.3.1 Environmental and Health Considerations

Several faculty interviews echoed similar sentiments from our student survey regarding the environmental and health considerations for menstrual products. One faculty member noted that she prefers to use organic, 100% cotton products because typical products contain bleach and other harmful substances, and for this reason, she would be unlikely to utilize free products on campus. However, she did note that she was in a financially stable place to afford the up-charge to get her preferred products, and that not all students have this luxury. Another faculty member noted that she was concerned about the environmental impact that the wasted plastic applicators have when menstrual products are utilized.

Multiple interviews identified that tampering with free products could be an issue if products were left in baskets on counters. Even if the products were not tampered with, users may be hesitant to use them due to personal safety concerns with using exposed products. One interviewee suggested that the products could continue to be dispensed by the machines, but to remove the cost. This would lessen the user apprehension surrounding the products, and would encourage more users to utilize them.

4.3.2 Marketing Considerations

Professor 4, who worked in menstrual product development before becoming a professor at WPI, stressed the importance of appropriate and adequate marketing if free products are

offered on WPI's campus. As proven by the C-Term trial and D-Term survey, users had very little awareness of a free option while it was offered, and very few users currently use the dispensers for their product needs. She emphasized that the products must have signage around them indicating that they are free so that students and faculty are encouraged to use them. Professor 4 also observed that many users would be likely to only use the free products in an emergency, as many are committed to the products that they frequently use and trust. In another interview, Professor 2 noted the marketing angle that could benefit WPI when reaching prospective students. This notion was supported by the data we received from the A-Term student survey.

4.3.3 Facilities Considerations

While student body and faculty opinions were important for justifying our cause, speaking with facilities was imperative to ensure the eventual success of our goal. The discussion with the Associate Director of Buildings & Events in the Facilities Department in D-Term addressed cost, labor, and distribution, as well as the overall impact to the facilities department at WPI. We discussed the dimensions of free product distribution that we were aware of thus far and gathered his opinions on them, which are summarized in Appendix E14. He favored the use of dispensers to provide free products because he believed it would lessen the chance of users taking advantage of the initiative.

At the end of A-Term, our team also connected with Ronald O'Brien, the Director of Facilities Operations at WPI. Mr. O'Brien preferred the solution that utilizes the current supplier, Citron Hygiene, to provide free products on campus because of storage considerations.

5.0 Development and Evaluation of Alternatives

In addition to the qualitative data collected on market needs, this chapter describes the quantitative analysis our team conducted on the existing WPI custodial staff's processes and the WPI budget. The alternatives developed are also presented and analyzed in this chapter.

5.1 Axiomatic Design

Axiomatic design allowed our team to evaluate the need for free menstrual products on WPI's campus and understand the design requirements for a possible solution to the problem. In Figure 10, the axiomatic design process is applied to our project.

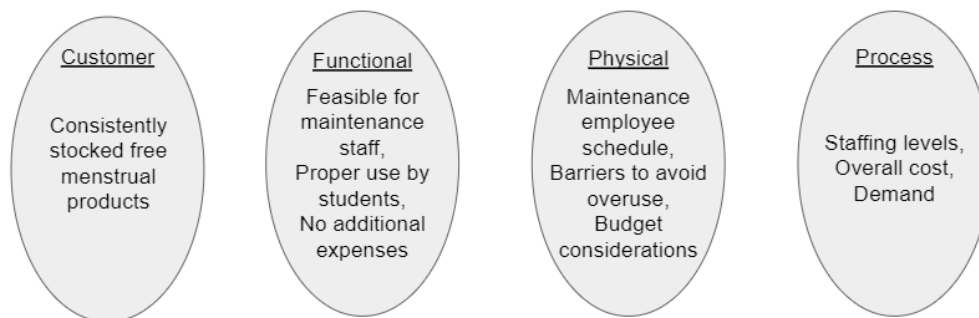


Fig. 10. Axiomatic Design for Free Menstrual Program

In this case, the customer, WPI students, require consistently stocked, free menstrual products in WPI's restrooms. This customer requirement was determined by analyzing our survey results (Appendices H and J). The functional requirements are the feasibility of this process for the party restocking the products, the honor code amongst users to not take advantage of the free products (over-utilization), and that offering free menstrual products on campus considers budget restrictions for WPI. The corresponding design parameters are that the staff's schedule is meticulously planned to allow for this responsibility, that there are barriers in place that do not allow for students to take advantage of this initiative, and that the budget can be worked in such a way as to allow this initiative to not cost more than WPI already pays. The

process variables are staffing levels on a given day, overall cost, and demand for the menstrual products. The result of our axiomatic design analysis helped inform our recommendations and how they affect the WPI Facilities Department's operations.

Our team considered these axiomatic design elements during the development stage to find sustainable solutions that meet the requirements of all parties involved in this initiative. All of our recommendations were created on the basis of our customer requirement, which is to provide free and consistently stocked menstrual products for students. The functional and physical requirements determined in the axiomatic design were considered and applied to our scenario analysis and solutions to ensure that they are met. For example, one major functional requirement is that no additional cost is incurred to WPI by offering free products; therefore, our potential solutions and recommendations provided a budget analysis. Please see our interactive scenario analysis tool in Deliverables 1 for the application of the axiomatic design parameters for each alternative.

5.2 Interactive Scenario Analysis Tool

Our team created an interactive scenario analysis tool for our stakeholders to utilize when making their final decision regarding the process of distributing menstrual products to WPI's campus. The scenario analysis tool considers cost and labor efficiency, and is able to account for differing levels of student need, as well as various product types for several different scenarios of potential menstrual product distribution. The tool contains sections for demand, number of machines, economic ordering quantity, and product costs, which all interact dynamically with the overall cost comparison section. We used the tool to conduct an initial analysis of several alternatives, as described in the following sections.

seconds to restock because of the pre-filled cartridges of product. Ron O'Brien suggested increasing this estimation to 90 seconds to account for the learning curve associated with dealing with new machines, and the time the custodial staff will be taking to restock their carts and storage facilities. We estimated that restocking will occur once daily per machine based on our demand estimates.

5.3 Demand Estimates

Currently, the utilization rate of products is not tracked or known to WPI. Therefore, our team created an estimate for the annual demand for menstrual products on WPI's campus by multiplying the estimated number of menstruators by 86% (Nelson, 2020) and multiplying it by the 8 months that most students are on WPI's campus. For WPI, we estimated the number of menstruators by halving the current total student population and found it to be 3,437 (Worcester Polytechnic Institute, 2019), and therefore the number of unexpected periods would be just over 3,000. The number of menstruators can be changed from year to year and the tool will calculate the corresponding unexpected periods for that population. This tool calculates the annual product demand by assuming that the menstrual products program will provide one product per period for each of the estimated users of this program. Under this assumption, the calculation yielded an estimate of 23,648 products per year.

We considered our base of 23,648 products as our medium demand projection, as it involves a realistic analysis of students who menstruate utilizing this program appropriately. In the secondary tab of the scenario analysis tool, the interactive scenario tool also provides analysis for high demand and low demand, by accounting for 25% above and below our medium demand estimate. The high demand was calculated to be 29,560 products per year and the low demand was calculated to be 17,736 products per year. Despite calculating these additional

demand estimates, our team believed that our medium demand of 23,648 products was likely already an overestimate, but would account for any initial overuse of the products that would be expected with the adoption of this solution.

Our team also utilized economic ordering quantity (EOQ) calculations to determine the number of cases of menstrual products that should be ordered at a time by WPI Facilities. We estimated the holding cost of the product to be 5% of the product cost (\$6.25). We estimated the yearly demand to be a total of 23,648, which yields an order quantity of 11,824 items for each product, or about 24 cases of each product per year, as the products ship in cases of 500. Figure 11 illustrates that eight cases of each product type should be ordered 2-3 times per year to meet the aforementioned demand. At a minimum, the WPI Facilities’ office must order eight cases in each order to meet the shipping cost discount requirement, so ordering 16 cases exceeds this requirement. The discount decreases the cost of shipping from \$10 to \$0. Figure 12 shows our team’s EOQ calculations, based on the number of cases (500 products per case) in more detail.

Economic Ordering Quantity		
PADS	no discount	
EOQ=	$\sqrt{2 \cdot D \cdot S / H}$	
	D=annual demand	23.65
	S=cost per order	\$10.00
	H=I*C=holding cost	\$6.25
	I=holding cost percent	0.05
	C=cost per item	125
EOQ	8.699425268	
TAMPONS	no discount	
EOQ=	$\sqrt{2 \cdot D \cdot S / H}$	
	D=annual demand	23.65
	S=cost per order	\$10.00
	H=I*C=holding cost	\$6.25
	I=holding cost percent	0.05
	C=cost per item	125
EOQ	8.699425268	

Fig. 12: Economic Ordering Quantity

5.4 Development and Evaluation of Alternatives

Each subsection in this section presents an alternative and analyzes the potential solution based on cost and demand. When creating our final list of solutions to evaluate, our team confirmed whether the solution in question was within the scope of our project to sufficiently analyze. To ensure solution feasibility, our team considered our methods and previous findings to develop the following potential solutions for consideration through use of the scenario analysis tool:

1. Citron Hygiene Free Product Machines
2. Health Services Free Product Plan
3. Free Product Machines by Aunt Flow and Facilities
4. Existing Citron Hygiene Contract

5.4.1 Creating a Benchmark with the Existing Citron Hygiene Contract

In order to establish a benchmark to compare our solutions to, our team first assessed the current menstrual product distribution through continuing to utilize Citron Hygiene to restock existing machines and charge \$0.25 per product. By analyzing the current product distribution method with our scenario analysis, our team was able to compare and highlight the efficiencies that our new solutions will bring to the institution. The existing contract currently costs WPI \$8,600 per year for Citron Hygiene to restock the 28 machines on campus. Citron Hygiene currently does 100% of the maintenance for the machines. WPI has no access to these machines, outside of their contact within Citron Hygiene. The second column in table 1 shows the cost breakdown of this alternative. It is important to note that Citron Hygiene's current process does not involve recording the items restocked and demand at every school. Our team hypothesized that this lack of data is because it does not serve Citron Hygiene to know how much product is

required for each school, as the contracts are a set price based on the number of machines, rather than product demand.

5.4.2 Citron Hygiene Free Product Machines

Our first potential solution analyzes the costs and labor associated with offering free products through Citron Hygiene with touch-free, ADA compliant machines. This would be easy to implement, as WPI has a long-standing relationship with Citron Hygiene and the logistical changes would be minimal. Cost-free machines would replace the current machines that would continue to be stocked and serviced by Citron Hygiene. These new machines cost \$390 annually, compared to the \$300 for the current machines. This would result in an increase of \$2,268 per year for the contract with Citron Hygiene, which would be a grand total of \$10,920 per year. This price includes the products, the restocking of the products in the existing machines, and that they are completely free for students. The second column of table 1 shows the cost breakdown of this alternative. One flaw to this solution revolves around demand. In this scenario, the WPI Facilities Office has no control over the cost of product since Citron Hygiene's contract includes a flat-rate payment despite a fluctuation in demand and utilization.

5.4.3 Health Services Free Product Plan

In our second potential solution, WPI Health Services would continue to order menstrual products and distribute them for free to students who inquire about them. WPI Health Facilities currently provides menstrual products for free in their restrooms and at their front desk kiosk, but there is low awareness of this process from WPI students. This solution integrates the current menstrual product distribution plan by WPI Health Services to students and the existing contract with Citron Hygiene, the third-party menstrual product vendor. While products would cost \$0.25

in the 28 restrooms, there would be the option of securing free menstrual products as needed from WPI Health Services. This solution focuses mostly on the need for education for campus regarding this initiative at WPI Health Services to WPI students so that they are aware free menstrual products are available in the WPI Health Services office. This education can be done through flyers in restrooms and emails from the WPI Health Services Office. The WPI Health Services Office would also need to start tracking their orders and usage, which they do not do at this time, as the demand is not high enough to track.

Based on our survey results, we estimate that WPI Health Services will have demand for 2,000 products per year. We estimate that this would cost WPI an additional \$500 per year, resulting in an annual total of \$9,100 (including the free products and the existing contract with Citron Hygiene). WPI Health Facilities should expect a small increase in demand when students are made aware of this offering, but our team predicts it is unlikely that students will travel off campus to WPI Health Services for a menstrual product when there are other, potentially easier alternatives such as going home. The third column of table 1 shows the cost breakdown of this alternative.

This solution also protects against students who could potentially take advantage of the free menstrual products by taking more than they need. The WPI administration has expressed concern about cost increases if students were to take advantage of the free products, so having the products monitored would mitigate this risk significantly.

5.4.4 Free Product Machines through a Subscription Service

Our third potential solution is to utilize Aunt Flow, a menstrual product subscription service, in conjunction with WPI Facilities for restocking the machines. Aunt Flow provides contactless machines at \$200 per machine, and the ability to order 500 pads or 500 tampons at a

unit cost of \$125 per case. Aunt Flow also provides free shipping on orders over \$1,000. For orders less than \$1,000, shipping costs \$10. Replacing the 28 existing menstrual product machines on WPI's campus would cost \$5,600. Our team estimated the annual demand for free products to be 23,648 products per year, as shown in the scenario analysis. The fourth column of table 1 shows the cost breakdown for this alternative.

After the upfront cost of replacing the machines and using this demand estimate, our team estimates that the yearly cost for menstrual products from Aunt Flow would be \$10,200 per year, which is significantly less than the proposed \$10,920 annual fee for free products from Citron Hygiene and the existing contract of \$8,600 from Citron Hygiene. The cost to implement this alternative for the first year, including the new machines, would be \$15,800. If the demand meets our high estimate of 29,560 products, the cost for the first year would be \$17,300 and the cost for the following years is \$11,700. If the demand meets our low estimate of 17,736 products per year, the cost for the first year would be \$13,175 and the cost for the following years would be \$7,575. For a cost comparison of the different demand levels, please see the second sheet in our Scenario Analysis Tool in Deliverable #1. It is important to note that as WPI Facilities will be performing the ordering of the products, they will never be overpaying for unused products.

WPI Facilities would incur the responsibility of ordering products and restocking the machines. Our team does not anticipate this additional responsibility to result in a significant process change for the facilities department, as Aunt Flow's machines can easily be restocked in under 30 seconds; our team anticipates that WPI Facilities staff should be able to add this small task seamlessly into their current bathroom maintenance schedule. The machines also have a window on the side, which would allow the facilities staff to see if the machine needs to be restocked before opening it. Other machines require the products to be stocked individually, not

in convenient cartridges, so this model is ideal compared to the other machines available. It is important to note that machines are stocked with cartridges, so there will not be waste of a partially used cartridge. Additionally, menstrual products are used significantly less than toilet paper, so WPI Facilities would not need to go to the restroom to restock the machine except for when they are already on site to restock toilet paper. Based on EOQ calculations (described in the following section), our team recommends placing an order from Aunt Flow of eight cases of tampons and eight cases of pads 2-3 times per year. This meets the demand of 23,648 products per year while also qualifying the orders for free shipping. There is no additional discount for orders over \$1,000, leading our team to recommend ordering 16 cases at a time to prevent taking up too much storage space. Table 2, below, demonstrates how storage space will be affected based on demand.

5.5 Process and Inventory Analysis

To determine the feasibility of adding the responsibility to restock menstrual products to the WPI custodial staff's existing responsibilities, our team created a flowchart of the anticipated process for the WPI custodial staff. Please see the flowchart in Figure 13 and attached as Deliverable #2. This process includes the responsibility of restocking the menstrual product dispensers, which we believe can be easily added to their existing process based on the 90 second restocking time. The restocking time was estimated by Aunt Flow to be 30 seconds because of the easily used refill cartridges; after discussions with WPI Facilities, we added an extra 60 seconds to the time to ensure it accounted for other interaction custodial staff will have with the menstrual product distribution system, such as restocking the carts and supply rooms. Our team outlined the process in 12 steps, but we thought it was important to note that our

process adds only two additional to what WPI custodial staff already does. This process can be seen in Figure 13, with the additional steps highlighted.

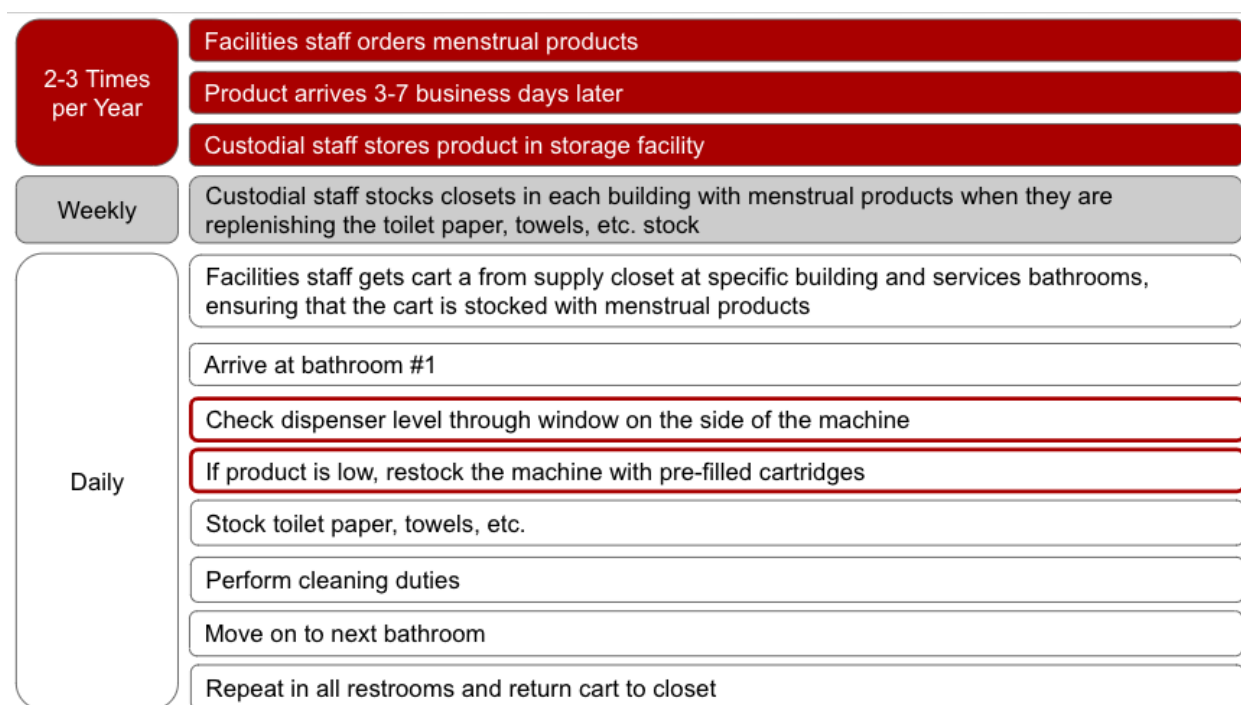


Fig. 13: WPI Custodial Staff Flowchart of Tasks

We were also able to speak with Ronald O'Brien, the Director of Facilities Operations, to discuss the current inventory storage process at WPI. Ron indicated that WPI is currently lacking a central storage space that accommodates the number of products they currently manage, so adding menstrual products would be a challenge. That being said, he explained that local storage facilities (i.e. storage closets in each building on campus), as well as the custodial distribution carts do have the capacity to add menstrual products. Our representative at Aunt Flow informed us that the cases of pads are 16.5 in. x 9.7 in. x 18.3 in., and the cases of tampons are 17.5 in. x 9.4 in. x 6.6 in. The cases weigh 10 and 6.3 pounds respectively.

Varying demand will also affect the space needed, which is shown in Table 2. The order size assumes an equal split of cases of pads and tampons. For example, in order to calculate the space required for medium demand, the order size, 16 cases, is divided in half, eight cases per

product, then multiplied by the dimensions of one case. Since the dimensions of one case of tampons differ from one case of pads, eight cases were multiplied by the tampon case dimensions and eight cases were multiplied by the pad case dimensions. It is important to note that the required space may not represent the required floor space, as boxes can be stacked. For example, if a medium demand order were to be stacked in a four by four arrangement, the floor space requirement would be 4.5 sq. ft. rather than 18 sq. ft., assuming two tampon boxes and two pad boxes would touch the ground. Our team hopes that the WPI Facilities Office will have adequate time to mitigate this issue, as the implementation of machines and start of product provision is currently proposed at the beginning of the 2022-2023 school year.

Table 2. Inventory Space Required for Demand

Demand Scenario	Demand	Order Size	Space Required
High Demand	29,560 products	20 cases	23 sq. ft.
Medium Demand	23,648 products	16 cases	18 sq. ft.
Low Demand	17,736 products	12 cases	14 sq. ft.

5.6 Establishing Scoring for Stakeholder Criteria

In the next sections, we present the criteria that each alternative was ranked against as well as the rationalization for each score assigned for every factor within a criteria category. Additionally, we recognized that some factors were more important to different stakeholders, so we explored changing the weights of each criteria category to examine the impact on the preferred solution.

5.6.1 Economic Criteria

The first economic factor to be considered by our team was the overall cost of each alternative that we would generate. Throughout our conversations with our stakeholders, the cost

to the school was consistently discussed with paramount importance. Next, our team denoted individual user costs as an important factor to consider against our alternatives. Lastly, initial machine cost needed to be considered as the implementation of new machines in the first year, and any subsequent phase of implementation, would incur a larger cost for the school. This was important to note due to the wide range of first year costs between our alternatives. A breakdown of our economic ranking criteria can be seen in Table 3.

Table 3. Economic Ranking Criteria

Cost	Yearly recurring product costs	20	Reduces WPI costs
		10	No cost changes
		0	Increases costs for WPI
Cost for users	Product is either free for users or remains at \$0.25	20	Free for users
		10	Costs \$0.25 for users with free options
		0	Costs \$0.25 for users
Initial Machine Costs	What is the projected cost of machines for the university? It is important to note that this is a one-time cost.	20	No additional machine cost
		10	Smaller initial machine cost
		0	Large initial machine cost

5.6.2 Investment in Long-Term Business Criteria

WPI must always be considering what characteristics or incentives make the school comparable and preferable to prospective students' other choices. Prospective students often judge schools based on its performance and offerings, so our team included analysis regarding the investment and effects each solution has on WPI's long-term image. One of the most important long-term factors of this project and overall initiative is the ability for an alternative to meet demand. Here, it is important to note that we did not foresee any of our alternatives negatively impacting the school's reputation and so all impacts are considered to be positive. A breakdown of our Investment in Long-Term Business ranking criteria can be viewed in Table 4.

Table 4. Investment in Long-Term Business Ranking Criteria

Meeting demand	Are there enough products for users?	20	Always enough products for users
		10	Sometimes enough products for users
		0	Never enough products for users
University Reputation	Will the alternative affect WPI's reputation amongst prospective users and stakeholders?	20	Improve WPI's reputation
		10	Project somewhat improves university's reputation
		0	No change in reputation

5.6.3 Social/Environmental Criteria

Through our feedback from faculty, staff and students in surveys and interviews, our team also decided to capture the environmental and social considerations for each alternative. First, our team chose to evaluate the general accessibility factors of each alternative, in terms of physical location of products on campus and the cost to the user. Another important factor to consider generally how the alternative will affect the experience of the user, if at all. Our final social consideration is any health considerations for the products that each alternative will provide. This was a concern that was initially presented in both student survey responses, as well as faculty interviews.

Lastly, our team wanted to evaluate environmental considerations regarding our solutions, checking compliance against the WPI Sustainability Plan (2012). Again, this was a concern introduced to our team during our faculty and student outreach methods. Table 5 shows the breakdown of the ranking criteria regarding Social and Environmental factors.

Table 5. Social and Environmental Ranking Criteria

Accessibility	How does the alternative relate to user accessibility? (Location, product cost to user)	20	Improves user accessibility
		10	Minor/No change to user accessibility
		0	Decreases user accessibility
Enhances user experience	Will the project enhance the user experience?	20	Enhances user experience on an ongoing basis, through its implementation and public education/outreach
		10	Enhances user experience only under special circumstances
		0	No change in customer experience
Consistent with WPI's Sustainability Plan	Is the project consistent with the university's most recent Sustainability Plan (2012), goals and objectives?	20	Consistent with Sustainability Plan
		0	Not consistent with Sustainability Plan
Health Considerations	Will the product put users in medical danger? <i>Organic and 100% cotton menstrual products are considered to be the safest options.</i>	20	Organic/100% cotton
		0	Traditional ingredients

5.6.4 Other Criteria

There were several criteria that did not fit in the above categories, but were important to evaluate when considering our solutions. When considering each alternative, our team evaluated the overall impact that each solution would have on university or WPI Facilities Office operations. Additionally, the overall risk was assessed for each potential solution. The breakdown of the Other section is shown in Table 6.

Table 6. Other Ranking Criteria

Impacts due to implementation/change	Will implementation of the project create impacts on the university's overall operations, for example, facilities' operations?	20	No anticipated impacts
		10	Minimal impacts on the university's overall operations
		0	Substantial impacts on the university's overall operations
Project risk	Risks associated with elements of the project not performing as expected. These can include: taking longer to implement than anticipated; product being more expensive; system functioning unreliably; benefits not as robust as forecasted; and unforeseen impacts of operation	0	Low risk
		-5	Moderate risk
		-10	High risk

5.7 Ranking Solutions against Criteria

After using the scenario analysis tool to explore the potential solutions, our team utilized ranking criteria in a decision matrix to weigh the solutions against each other. Please see the decision matrix attached as Deliverable #3. We wanted to create feasible solutions so that the ranking criteria could be most easily applied and so the benefits and detriments could be easily identified. Our final solutions are scored against our criteria in the following sections, with a final ranking of 23.75, 20.00, 27.50, and 17.50 for Free Products with Citron Hygiene, Current Citron Hygiene Contract with Free Products at WPI Health Services, Free Products with Aunt Flow, and the retaining the current contract with Citron Hygiene, respectively. These conclusions can be seen in Table 7. In order to allow for the decision matrix to be interactive and allow for reproduction or recreation of our weighting or scoring, the cells containing the total scores are coded with conditional formatting to highlight the solutions from best (green) to worst (red) using stoplight logic. Higher scores are considered to be better solutions.

Table 7. Overall Summary Table of Solution Ranking

Category	Category Weight	Free Products Citron	Free As-Is with Health Services	Free Products Aunt Flow	No Action - Citron \$0.25 Machines
Economic	25%	7.50	7.50	5.00	7.50
Investment in Long Term Business	25%	7.50	5.00	10.00	2.50
Environmental/Social	25%	10.00	5.00	15.00	2.50
Other	25%	-1.25	2.50	-2.50	5.00
TOTAL	100%	23.75	20.00	27.50	17.50

5.7.1 Alternative 1: Free Products with Citron Hygiene

The first alternative ranked against the decision matrix is for WPI to offer free products through Citron Hygiene. This solution received a score of 0 against product cost, as it will incur additional costs to the university. However, this solution would provide free products to menstruators, so it receives a score of 20 for user cost. For initial machine costs, this solution was ranked 10 because Citron Hygiene's free machines cost \$390. Though we were not able to get back in touch with the sales representative that we spoke with in D-Term, our last correspondence with her indicated that the contract would increase to reflect this cost from \$8,600 per year to \$10,920 per year.

The second section considers criteria that include the investment in the long-term business of WPI. For meeting demand, this solution was ranked 15 because there is the possibility that the machines could run out of product and be empty for some amount of time before Citron Hygiene comes to refill the machines. The second criterion in this section was university reputation, which was ranked 20 for this solution. Our team determined that offering

free products would improve the university's reputation, as WPI would be one of the first universities to offer free menstrual products for their students.

The third section considers criteria that relates to the environmental and social aspects of the solution. The first criterion was accessibility. This alternative was ranked 20 for accessibility because offering free products improves product accessibility for students since they no longer have to pay for the product in the inconvenient machines. The second criterion was if the solution enhances the user's experience. This alternative was ranked 20 because we believe that offering free products instead of charging users \$0.25 will increase the user experience. When considering if this solution is consistent with WPI's sustainability plan, this solution was ranked 0 because Citron Hygiene does not offer sustainable products or sustainable waste collection of the products, and therefore do not comply with WPI's sustainability plan. This solution was also ranked 0 for health considerations due to the nature of the in-organic products that possibly contain chemicals that are unhealthy for users. The products offered by Citron Hygiene are not organic, nor are they 100% cotton.

The last section of criteria considers miscellaneous considerations. When considering the impacts of implementation of offering free products through Citron Hygiene, a ranking of 0 was assigned because there will be no long-term effects on WPI's operations. When considering the risk of this solution, a ranking of -5 was assigned because of the potential that this initiative could take longer to implement than anticipated and the possibility that the machines could be empty for long periods of time, as WPI does not control when Citron Hygiene restocks the machines. Overall, this solution was ranked at 23.75, which is the second most-valued solution.

5.7.2 Alternative 2: WPI Health Services Free Product Plan

The second alternative our team considered is offering free products through WPI Health Services in addition to the existing \$0.25 per product offering through Citron Hygiene. The first section of criteria that this solution was ranked against is economic factors. This solution was ranked as 0 for cost, because it will not increase the cost to WPI drastically, if at all. Currently, WPI Health Services offers free products to students in the restrooms and the front desk. Educating students about this offering may increase demand slightly, but our team does not foresee a major cost increase here. This solution was ranked as a 10 for cost to students because the on-campus products that are easily accessible will still cost \$0.25 for users, but products would be available for free in WPI Health Services.

The second section of criteria considers the investment in the long-term business of WPI. The first criterion is meeting demand. This solution was ranked 15 because WPI Health Services is easily able to place orders for new products when their supply runs low, as they can actively see their inventory. This solution was ranked as a 10 for improving the university reputation because it is offering free products to students, but they are not offered for free campus-wide.

The third section of criteria considers the environmental and social factors of offering free products through WPI Health Services. When considering accessibility, a rank of 10 was assigned because while this solution does offer free products for students, they are inconveniently located in one location off campus. This solution was assigned a ranking of 10 for enhancing the user experience, again because while there are free products available, they are offered inconveniently off campus. When considering this solution's consistency with WPI's sustainability plan and health considerations, a ranking of 0 was assigned because the products

are neither organic nor 100% cotton and does not offer sustainable products or waste removal methods

The last section of the decision matrix considers miscellaneous factors. When considering potential impacts due to implementation, this alternative was assigned a 10 because it will cause minimal change to WPI's budget and processes; there is the potential that WPI Health Services may need to order more products, but this is unlikely. When considering the risks associated with this alternative, a ranking of 0 was assigned because there is no risk associated with this solution since this alternative is currently in place at the university. This solution achieved a score of 20, which ranked third place among the potential solutions.

5.7.3 Alternative 3: Free Products through Aunt Flow and WPI Facilities

The third alternative our team considered was providing free products on WPI's campus through Aunt Flow, a menstrual product subscription service, with restocking completed by WPI Facilities. The first section of criteria our team considered were the economic considerations. The first criterion was cost to WPI. This solution was ranked 0, as it will incur additional costs for WPI every year for menstrual products. This estimation was made from our team's scenario analysis spreadsheet, which estimated a total yearly cost of \$10,200 for this solution, which includes product costs and labor. When considering the cost for users, this solution was ranked at 20 because it offers free products for users. When considering the initial machine costs, this solution was ranked 0 because it will cost WPI \$5,600 in the first year to install the new machines.

The next category of criteria was investment in the long-term business of WPI. When considering the demand of products for students, this solution was ranked 20 because our team does not foresee any empty machines. Our team assumes that the demand for toilet paper is

much higher than the demand for menstrual products, which is restocked continuously throughout the day by WPI Facilities, unlike our contract with Citron Hygiene, from which we must wait for Citron Hygiene employees to come to campus and refill the machines every 2-4 weeks or upon the university's request. Additionally, the WPI Facilities Office will have more control over the money spent on menstrual products, if the demand does not meet our estimates, unlike any contract with Citron Hygiene, which would remain a flat rate regardless of demand. When restocking the menstrual products, the facilities staff can easily see through the window on the side of the menstrual product machine to see if the product is empty, and whether it needs to be refilled. This solution was ranked 20 for university reputation, because offering free, high-quality products on campus has not been done by many universities, so WPI would be at the forefront of this movement.

The next section considers the environmental and social factors of this solution. This alternative was ranked 20 for accessibility for students because it will provide free products in many restrooms on WPI's campus. Additionally, Aunt Flow's machines are ADA compliant, so any student with a physical disability would have an easier time accessing the products using the no-touch machine. This alternative was also ranked 20 for enhancing user experience because students will have consistent access to free menstrual products in case of emergency in most on-campus bathrooms. This will limit the amount of time students' may lose going to WPI Health Services, to a pharmacy, or their homes to retrieve these products. This solution was ranked 20 when considered against the health considerations and WPI's Sustainability Plan because the products are 100% cotton, organic, and are sustainable. Additionally, multiple student responses from our D-Term survey identified the product quality to be an important aspect of menstrual products because of potential health risks associated with using a lower quality product. Aunt

Flow also offers sustainable waste removal bins for in-stall placement, which aligns with WPI's Sustainability Plan.

The final section of ranking criteria considers miscellaneous factors for implementing this solution. WPI's administration expressed concern about the cost associated with students taking excessive amounts of products, so these machines would mitigate this issue. When considering the potential for changing the existing WPI Facilities procedure and incurring additional expenses, this solution was ranked 0. Offering free products through WPI Facilities and Aunt Flow will change WPI's current menstrual product distribution system drastically. When considering the risks associated with this solution, a ranking of -10 was assigned because there is high risk that WPI Facilities staff will not like their new responsibilities, or that WPI students may take advantage of the free product initiative and empty the machines, thus costing WPI additional expenses. Overall, this solution was ranked 27.50, which was the highest ranked solution.

5.7.4 Alternative 4: Maintain Existing Contract with Citron Hygiene

The final alternative that our team considered was to not make any changes to WPI's current menstrual product process. This process involves maintaining the university's current contract with Citron Hygiene and offering menstrual products in the current dispensers for \$0.25. Our rationale for including this alternative was to bring attention to how the current operations could be improved by any of the additional alternatives that we offered.

This alternative was first looked at under the criteria of "economics." Within this category, our team analyzed the alternative based on yearly cost, cost for machines, and cost for students. For yearly cost, we gave this alternative a ranking value of 10 which reflects no cost changes. For initial machine costs, we gave it a ranking value of 20 which represents no

additional machine costs. Lastly, this solution was assigned a value of 0 for the user cost category, representing a cost (\$0.25) for users.

The next criteria category was Investment in Long-Term Business. Within this category, our team looked at meeting demand and university reputation. For meeting demand, we gave this alternative a value of 15, which represents sometimes having enough products for students. We gave this value because Citron Hygiene dispensers only hold about 10-20 products at one time, it is difficult to see when the machines are empty, and when they are empty, WPI is required to contact Citron Hygiene and wait for the company to refill the machines themselves. This can take minimum one day, but often times more. For the university's reputation, we gave this alternative a value of 0, which represents no change in the university's reputation.

The third criteria category was Environmental/Social. Within this category, sub-considerations were student accessibility, user experience enhancement, health considerations, and consistency with WPI's Sustainability Plan. For student accessibility, we valued this alternative at a 10, which represents minor or no change to user accessibility. For user experience, we gave this alternative a value of 0, which represents no change in customer experience. For health considerations, we valued this alternative at a 0, which represents the use of menstrual products with traditional ingredients rather than 100% cotton or organic options. Finally, for the alignment with WPI's Sustainability Plan, we valued this alternative at a 0 because it does not provide sustainable menstrual products, and therefore does not align with WPI's Sustainability Plan.

The last criteria category includes impacts due to implementation and change as well as the project's risk. For implementation impacts, we gave this alternative a 20 because there is no change associated with this alternative. Similarly, for project risks, we gave this alternative a

value of 0, which indicates low risk for this project considering there will be no change. With all of these values, the final total ranking criteria value for the no-change alternative is 17.50, which is the lowest valued solution.

5.7.5 Exploring Alternative Weighting to Represent Stakeholder Opinion

In order to effectively produce evaluations of solutions for this project against all of the aspects for consideration, as well as to gain more insight about which solution is the best overall implementation plan for WPI, our team ran multiple sensitivity analyses in which we altered weights to reflect the priorities of different stakeholders. In total, we completed three sensitivity analyses that represented each of our three major stakeholders - WPI students, WPI Administration, and the WPI Facilities Office. Our team selected those criteria categories that encompassed the most important aspects and considerations for each stakeholder group based on our conversations and survey feedback that we collected from the project stakeholders.

Since our project goal was initially centered around the experience and access for menstruating students on campus, we began with the generation of the table that reflected those views. Through our student survey in D-Term, user safety and environmental concerns were brought up significantly more than specific implementation or cost factors by students, apart from the need for products to be free. For this reason, our team placed more weight on the Environmental/Social category in order to capture this opinion, and the remaining weighting was split equally between the three remaining categories. Table 8 summarizes these results below.

Table 8. Student-Weighted Summary Table

Category	Category Weight	Score			
		Free Products Citron	Free As-Is with Health Services	Free Products Aunt Flow	No Action - Citron \$0.25 Machines
Economic	20%	6.00	6.00	4.00	6.00
Investment in Long Term Business	20%	6.00	4.00	8.00	2.00
Environmental/Social	40%	16.00	8.00	24.00	4.00
Other	20%	-1.00	2.00	-2.00	4.00
TOTAL	100%	27.00	20.00	34.00	16.00

Similarly, the weight for economic considerations was increased for WPI's administration, as this was the most consistently discussed concern regarding potential solutions.

Table 9 summarizes these results below.

Table 9. Administration-Weighted Summary Table

Category	Category Weight	Score			
		Free Products Citron	Free As-Is with Health Services	Free Products Aunt Flow	No Action - Citron \$0.25 Machines
Economic	40%	12.00	12.00	8.00	12.00
Investment in Long Term Business	20%	6.00	4.00	8.00	2.00
Environmental/Social	20%	8.00	4.00	12.00	2.00
Other	20%	-1.00	2.00	-2.00	4.00
TOTAL	100%	25.00	22.00	26.00	20.00

Finally, our team completed a decision matrix with Facilities as a stakeholder. We adjusted the weight of our “Other” criteria to be 35%, since this contains the ranking for solutions based on how much they impact current university processes. We also changed the “Economic” weight to be higher, at 30% since this is another high priority for Facilities. Table 10 summarizes these results below.

Table 10. Facilities-Weighted Summary Table

Category	Category Weight	Score			
		Free Products Citron	Free As-Is with Health Services	Free Products Aunt Flow	No Action - Citron \$0.25 Machines
Economic	30%	9.00	9.00	6.00	9.00
Investment in Long Term Business	20%	6.00	4.00	8.00	2.00
Environmental/Social	15%	6.00	3.00	9.00	1.50
Other	35%	-1.75	3.50	-3.50	7.00
TOTAL	100%	19.25	19.50	19.50	19.50

With this weighting allocation, all of our alternatives rank almost identically, with our free product provision by Citron Hygiene edging out the other solutions by 0.25 points.

5.7.6 Selection of Preferred Alternative

In light of the previous discussion, our team moved forward with a recommendation to pursue our Aunt Flow subscription model alternative to replace WPI’s current menstrual product distribution program. Aunt Flow is slightly cheaper than the Citron Hygiene Free Product machine alternative, but allows for WPI Facilities to control how much product they are ordering, while Citron Hygiene charges a flat rate regardless of demand. The cost of the Aunt

Flow program is dependent on demand, while the Citron Hygiene alternative is a constant price regardless of demand. While this could mean WPI incurs the extra cost of high demand for products, it more than likely means that they will no longer be paying for a service that is not being used to its fullest potential. We predict the change in cost to be no more than +/- \$1,500 for a higher and lower demand respectively.

Our team believes that this solution is the most cost effective for WPI as implementation allows more control regarding the amount of product ordered, and therefore, accomplishes a more accurate utilization rate while providing students with healthy, consistently stocked, free menstrual products. Table 11 summarizes both the first year and the remaining year costs for all of the alternatives our team presented. Despite higher projected initial and recurring costs for Aunt Flow implementation options, Aunt Flow is the only alternative that depends on demand and consequently, is the only alternative where costs can be adjusted as demand estimates fluctuate. Aunt Flow is also the best alternative when considering all additional elements of our multi-dimensional problem, and therefore is our team's final recommendation to WPI.

Table 11. Summary of Costs

Alternative		Cost for First Year	Cost for Remaining Years
Citron Hygiene Existing Contract		\$8,600	\$8,600
Citron Hygiene Free Products		\$10,920	\$10,920
Aunt Flow Subscription Service (Varying demand levels)	Low Demand	\$14,300	\$8,700
	Medium Demand	\$15,800	\$10,200
	High Demand	\$17,300	\$11,700
WPI Health Services Free Products		\$9,100	\$9,100

5.8 Implementation Plan

To ensure that WPI understands the potential economic risk of this program before fully transitioning, we suggest using the scenario analysis tool to explore the potential costs based on their estimations of demand. While our team offered three demand scenarios, WPI may wish to use this tool to gain a more accurate picture. They can also use this tool to explore an incremental plan for the initial installation of a few machines in highly trafficked restrooms for the first year of the program. If this trial goes well, WPI can continue to install more machines every year until all machines have been replaced.

In order to ensure a successful implementation of our proposed solution, our team held a transition meeting between our team, PERIOD@WPI, and our Aunt Flow representative. PERIOD@WPI took over our project at the end of A-Term, so this was a necessary connection to make. Additionally, we recommend that WPI Facilities debrief their custodial workers on the ease of restocking these products, so the custodial staff fully understand their new responsibilities and the functionality of the machines they will be working with for a successful implementation. In addition, the debrief should emphasize the importance of offering free products for the well-being of students. This information can be conveyed through team meetings, as well as informational flyers around campus in spaces the custodial staff frequents, such as supply closets.

Storage space will need to be made available for the new inventory required for the free menstrual product initiative. Available storage space has become less available with the increase of COVID-19 cleaning supplies on WPI's campus. If WPI Facilities orders our recommended eight cases of each product, the required amount of storage space is 446 sq. ft. Our team suggests that rather than utilizing the central, over-filled, storage space for these products, the WPI

custodial staff distribute the menstrual products to each storage closet in the buildings with machines. Alternatively, the WPI Facilities department could opt to order a lower quantity while transitioning to this product distribution method to lessen the immediate impact in the storage facility.

Finally, to ensure that the proposed process for menstrual product distribution is feasible, we recommend conducting kaizen events with the custodial staff to facilitate open communication. Kaizen events are an open forum in which workers can voice their opinions on a new process (Van Aken, 2010). This will allow for WPI Facilities managers to understand any problems that have presented themselves, and ensure that the custodial staff feels that their opinions are heard.

6.0 Conclusions and Recommendations

Generally, menstrual product accessibility due to price and product location is a prevalent issue for college students. WPI is not providing students with adequate access to menstrual products on its campus through its current contract with Citron Hygiene, offering menstrual products in dispensers for \$0.25 each. Access to menstrual products is a necessity for both students and faculty members as menstruation is not something they can control and a majority of women start their period unexpectedly (Harp, 2019). College students are even more disadvantaged due to the financial burden and lack of transportation to buy menstrual products off campus. An effective, user-conscious free product initiative on campus will ensure product accessibility and enhance user experience, and therefore the WPI experience.

6.1 Recommendations

After discussing the initiative with WPI Facilities and Dean Emily Perlow, surveying students, and exploring the potential for free products with both WPI Facilities and the third-party product vendor, Citron Hygiene, our team evaluated four alternatives to move towards a permanent implementation of free products on WPI's campus. Additionally, we produced an interactive scenario analysis spreadsheet and decision matrix to support analysis of any potential new alternatives, as decided by the school. In Chapter 5, we described the current product distribution by WPI to provide a benchmark for our proposed solutions. Then, we introduced our alternative solutions which we analyzed using the scenario analysis tool. The alternatives are listed below.

- Citron Hygiene Free Product Machines: Citron Hygiene restocks new, touch-free machines that provide free products.
- WPI Health Services Free Products: WPI Health Services offers free products to students in addition to the existing Citron Hygiene contract.

- Aunt Flow Free Product Machines: WPI custodial staff restock new, touch-free machines with product provided by Aunt Flow.

After detailing these solutions, our team then ranked each solution against defined ranking criteria in a decision matrix. In this section, our team summarizes our ideal free menstrual product distribution system and provides recommended next steps to enact free products on WPI's campus.

6.1.1 Recommendation for Action

Our team recommends that WPI pursues our third solution, which includes utilizing Aunt Flow, the menstrual product subscription service, and WPI Facilities to distribute the menstrual products into new, contactless machines. We have determined that this solution is the most sustainable in the long-term because of the lower cost of products compared to the existing contract with Citron Hygiene. While there is a start-up fee of \$5,600 for new machines, this cost could be mitigated by utilizing the Student Government Association to fund the new machines, or the installations can be completed in phases. The cost for the first year with Aunt Flow, including the new machine cost, is \$15,800. In the following years an estimated cost of \$10,200 will be incurred, based on our conservative demand estimate of 23,648 products. This solution is less expensive than utilizing Citron Hygiene for free product machines and allows for more access to products than the WPI Health Services option. This solution also provides WPI students with sustainable and health-conscious products, which is not offered by other solutions we considered. This solution satisfies our project goals because it is the least expensive free product distribution alternative that provides students with consistently stocked and healthy products. As a formal proposal must be made regarding any allocations to the WPI Annual Budget, we presented our data and final report to PERIOD@WPI and Dean Perlow to aid in

securing a buy-in and support from Vice Presidents of Student Affairs and the WPI Facilities Department. Other models for free product distribution can be considered if this solution is not desirable.

6.1.2 Recommendation for Further Research

Our second recommendation is that a second free product trial be conducted by PERIOD@WPI when traffic on campus normalizes to better confirm campus demand and establish a better estimation of costs.

6.1.3 Recommendation for Education

Our team also encourages an educational campaign to be launched by PERIOD@WPI. This action is recommended in the anticipation of free products on campus, but also to continue the efforts of the organization and of this project - to educate individuals about menstrual health and poverty, especially at a time where equality is a recent focal point of many organizations where disparities are historically prevalent. Additionally, we recommend that PERIOD@WPI include the locations of all available menstrual products on campus, as well as WPI's policies regarding menstrual products and menstrual health.

6.1.4 Recommendation for Transition

Finally, in order to ensure a smooth transition to the new free menstrual product offering on campus, our team recommends taking these steps:

1. Use the scenario analysis tool provided by our team to explore various implementation options for installing machines in phases, for example, yearly installations of 5 machines beginning in restrooms with high traffic.

2. Ensure all parties involved understand the importance of offering free products for the well-being of students on campus in order to properly implement the educational campaign for students.
3. Debrief WPI Facilities workers on their new responsibility of stocking the menstrual products in the machines and ensure they understand the functionality of the machines they could be working with.
4. Create storage space for a maximum of eight cases of tampons and eight cases of pads at one time. The WPI Facilities Office should also create local storage and restocking cart space for small amounts of menstrual products to be placed into restrooms.
5. For the first few months of the free product offering, host kaizen events with the facilities staff to facilitate open communication which will lead to an understanding of any existing issues.
6. After one semester of offering free menstrual products, evaluate the demand and costs incurred by WPI to ensure that the program is meeting its goals and is not going over the anticipated budget. This can be carried out by PERIOD@WPI.

We believe that these steps provide a guide to easily implement a free menstrual product program on WPI's campus for both the WPI Facilities Department and the WPI budget.

6.2 Conclusion

Offering free menstrual products on WPI's campus improves student welfare and general equality on WPI's campus. After thoroughly analyzing and ranking various solutions against key decision-making criteria, our team identified that using Aunt Flow's new, touch-free machines and healthy menstrual products is the optimal solution for the lack of access to menstrual products on WPI's campus. While our team has also effectively evaluated three other potential avenues of action, we urge our stakeholders to carefully consider the benefits of this project and the potential results posed for WPI's community. When action is taken to present all students, faculty, and staff access to menstrual products, WPI will be at the forefront of this movement, distinguishing this school to incoming students for the inclusive and accommodating environment it presents.

7.0 Reflections

In this section, we reflect on four major components of our project experience: design, constraints, experience acquiring and applying knowledge, and teamwork.

7.1 Discussion of Design

Our team designed a process for free menstrual product implementation on WPI's campus, a situation analysis tool that analyzed cost, inventory levels, and demand, and a decision matrix that evaluated each potential alternative. Our team identified the need for free products on WPI's campus through research and community outreach. Project requirements were created through conversations with our stakeholders; these conversations were also extremely important when we developed our decision matrix model since our main goal of supporting a successful implementation could not be met without satisfying these individuals. Using this data, our team was able to develop a flowchart and implementation plan that incorporated both the current state at WPI regarding menstrual products and the recommended steps our stakeholders should add to their roles in the future. To develop a design, our team utilized the engineering tools, Axiomatic Design and DMAIC to best create an accurate and efficient flow of tasks for both the WPI custodial staff and our implementation plan. The several alternatives our team developed were tested by having conversations about feasibility with our stakeholders. This ensured that all parties involved had a proposed alternative that they would feel comfortable implementing. Through this analysis, our team considered the risks associated with each solution, such as costs and difficulty meeting the new process requirements.

7.2 Discussion of Constraints

Our team considered many constraints when developing our proposed solutions for a free menstrual product implementation on WPI's campus, including cost, student health, feasibility of implementation, accessibility, and others. We utilized a decision matrix to weigh the different constraints in evaluating solutions. Our stakeholders emphasized the importance of the budgetary restrictions, which became a major constraint that our team considered. Therefore, much of our analysis in our scenario analysis tool was centered around cost.

Considering the welfare of WPI students through product accessibility was a key consideration as well. Our team determined that the existing menstrual product distribution system was not meeting the needs of the student body, and should be improved. When analyzing our potential solutions, we considered how the accessibility associated with each would impact the students' welfare.

The feasibility of implementing our potential solutions was a key constraint from the operational perspective. We considered which solutions would disrupt the existing operations of the WPI Facilities Department, and the risk associated with these disruptions. This helped us determine which alternative was the most feasible from an operational standpoint.

The result of our project will have an extremely positive impact on the WPI community, and potentially across the country. The students at WPI will have access to free products on campus, which will greatly improve the student welfare. Much of our initial research focused on the previous implementations of free products at schools and universities across the country, so it is possible that a free product implementation on WPI's campus could sway another institution to offer free products as well. Our project deliverables will also make evaluating the future of this initiative easier for the WPI Administration, making implementation straightforward.

7.3 Discussion of the Experience and Acquiring and Applying New Knowledge

One key experience our team gained during this project was the difficulty of completing a project with several parties that have different objectives and needs. Our project's goal was to improve the welfare of WPI students by providing free menstrual products; this objective became difficult when considering the different needs of the stakeholders, such as cost and feasibility of implementation.

Working on a tight timeline of 14 weeks with these barriers was difficult, especially when our team was waiting on information from other parties. The schedules of the stakeholders are always a major consideration when executing a project of this magnitude, so this was a valuable learning experience for our team. It taught us how to adapt our thinking to meet the needs of others, and how to change meeting plans to meet the needs of our stakeholders' busy schedules.

One technical skill our team developed in the methodology section is utilizing decision matrices to evaluate potential solutions. Industrial engineering courses do not cover this topic, so having the opportunity to research and apply this tool was extremely beneficial. Applying the decision matrix made it extremely efficient to compare the different priorities of our different stakeholders. It also forced us to quantify our different project goals and prioritize them. This skill will be useful in our future careers when we are undoubtedly required to weigh different potential solutions to a problem.

Our team also developed research skills during this project. Industrial engineering courses tend to focus on the technical aspects of problems, rather than how to research the history of a problem at other institutions. Working on developing our research skills throughout this project allowed us to fully understand our project's problem statement and the importance of

this initiative across the country. This skill will be extremely useful in our future careers when we are tasked with developing solutions for complex problems, as we will be able to develop and understand the broader context of this problem.

7.4 Discussion of Teamwork

Our team continuously utilized each other's strengths to accomplish our project goal. One strength of our project is that we offered numerous alternatives for the project stakeholders to choose from; these alternatives would not have been successfully analyzed and created without the input of each member of our team, as we all come from different backgrounds and have different skill sets. Our team considered many variations in the alternatives when developing them, and the input and collaboration our team exhibited was crucial in ensuring the thoroughness and feasibility of each alternative. Without being able to come together and discuss the different opinions our team had, our final solutions would not be as robust. We created this collaborative environment by doing the majority of our project work together, even if it was simply writing assigned sections of the paper. This allowed our team to bounce ideas off each other as they presented themselves. We also operated under the mindset that no idea or comment was bad; when developing complex alternatives, this is a crucial mindset to ensure all aspects of the problem are considered.

Every week, our team had a different leader. This ensured that no particular person was running the project or taking on an unfair amount of responsibility. This individual was responsible for creating the slides for our weekly meetings, sending the slides to our advisor, and keeping the team on track with updates and reminders. This worked well for our team because we all trusted each other's quality of work and ability to meet deadlines. Working in a collaborative environment with trusted teammates is the best way to accomplish a project goal.

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Deliverables

Deliverable #1: Scenario Analysis Tool

To use the tool, please see the attached Excel file titled “Scenario Analysis Tool.xlsx”.

Deliverable #2: Facilities Flowchart of Processes

To see our flowchart, please see the attached PDF file titled “Facilities Flowchart of Processes.pdf”

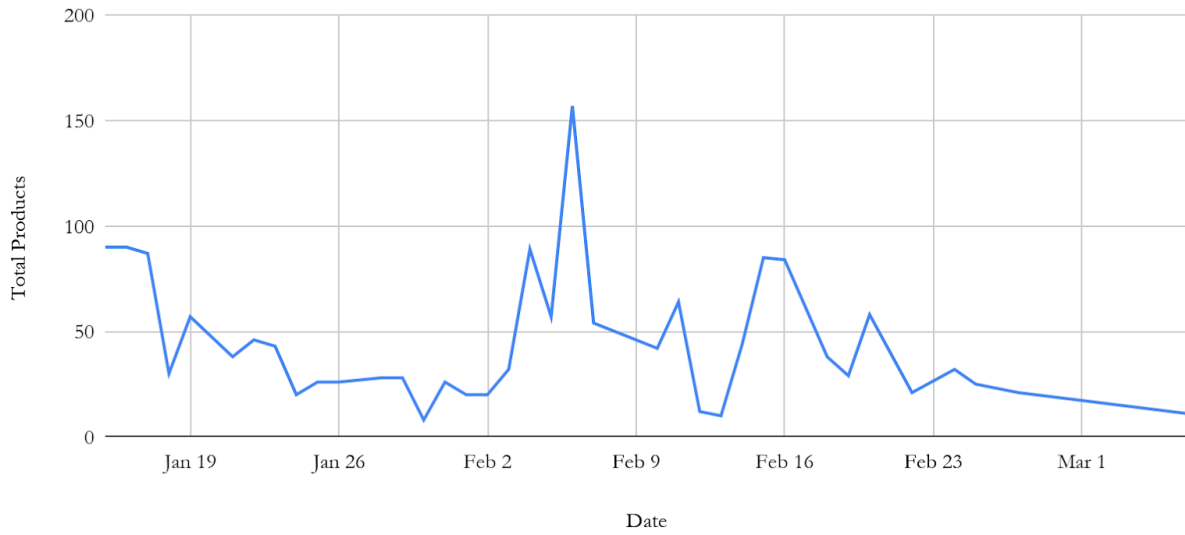
Deliverable #3: Decision Matrix using Ranking Criteria

To use the decision matrix, please see the attached Excel file titled “Decision Matrix.xlsx”

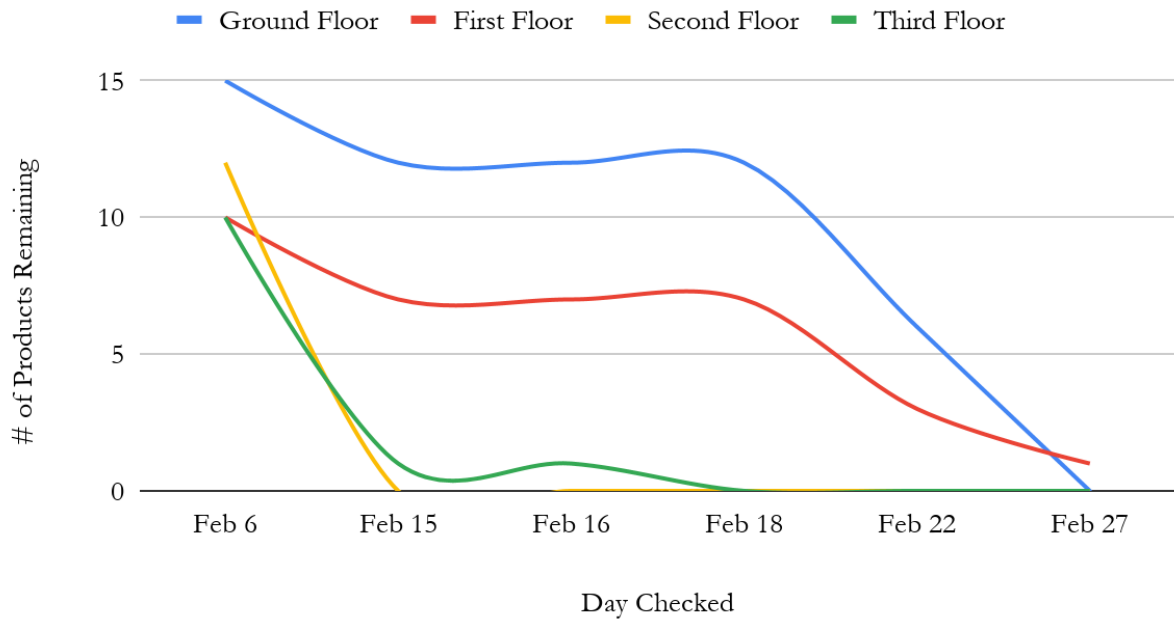
Appendices

Appendix A- C-Term Trial Graphs

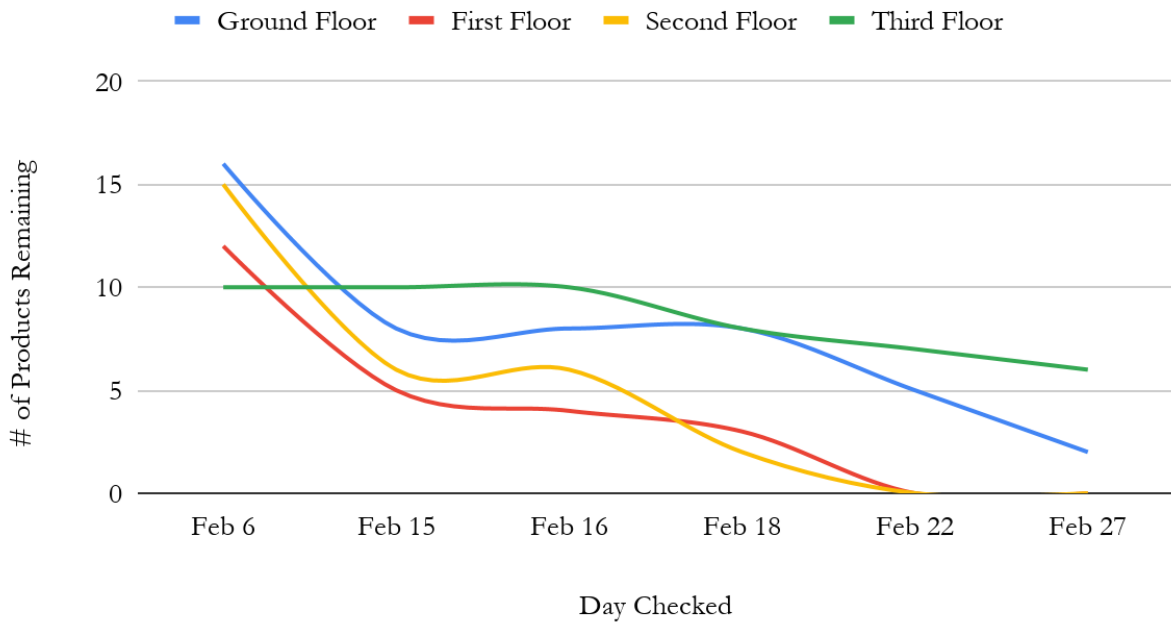
Product Utilization over Time



Gordon Library Pad Use



Gordon Library Tampon Use



Appendix B - Interview Questions

Appendix B1- Faculty Member 1 Interview Questions

Participant Notice:

Thank you very much for taking time out of your day to be a part of our study. We are a group of students from Worcester Polytechnic Institute in Massachusetts, USA. We are working with PERIOD@WPI and Dean Perlow to explore the potential for a permanent implementation of free menstrual products on campus. We would like to use this information to analyze campus opinions and feedback to fortify our future recommendations. In order to gain the most accurate responses, we will refrain from providing options for representatives to choose from, unless guidance is requested. Your participation in this interview is completely voluntary. You may withdraw your participation at any time. You may also refrain from answering any of the questions.

We will be taking minutes of this conversation - would you prefer to remain anonymous?

If name is provided: May we quote you in our report? If so, may we record you for an accurate transcript?

1. What, if any, were WPI's past efforts at menstrual equality? (Be specific; at what)
 - a. Were people (students, admin, profess, etc.) aware of this?
 - i. Do you think the general WPI population is aware that this initiative is trying to be put into action?
 1. Students, faculty, professors, administration
 - ii. If not, how can we make them aware?
 - b. Are people interested in helping in admin? (Are you looking to gauge a general level of support for the idea, or more specific types of help? Do you want to know who might be interested in helping?)
 - i. Does the WPI administration support this cause? Are they willing to make changes that we recommend?
2. Why do you support this cause? Do you think access is an issue for students?
3. Has any of this been discussed with the Facilities department? Do you know if they support this?
4. Where does WPI see this money coming from? Money already allocated for third-party company or student life fee?

- a. If more money is required, where do you anticipate funds being drawn from?
- b. Where is this money currently coming from?

Appendix B2 - Faculty Interview questions

Participant Notice:

Thank you very much for taking time out of your day to be a part of our study. We are a group of students from Worcester Polytechnic Institute in Massachusetts, USA. We are working with PERIOD@WPI and Dean Perlow to explore the potential for a permanent implementation of free menstrual products on campus. We would like to use this information to analyze campus opinions and feedback to fortify our future recommendations. In order to gain the most accurate responses, we will refrain from providing options for representatives to choose from, unless guidance is requested. Your participation in this interview is completely voluntary. You may withdraw your participation at any time. You may also refrain from answering any of the questions.

We will be taking minutes of this conversation - would you prefer to remain anonymous?

If name is provided: May we quote you in our report? If so, may we record you for an accurate transcript?

1. How long have you worked at/been affiliated with WPI?
2. Were you aware of the C-term trial for free menstrual products? Did you notice them in any restrooms?
3. Did you hear about any students either using or not using the products?
4. If so, do you have any feedback on it? Such as restrooms that offered the products, distribution, stocking levels, marketing, etc.
5. How likely are you to utilize free menstrual products in WPI's bathrooms and why?
6. What do you currently know about the free menstrual initiative on campus/menstrual products on campus in general?
7. Is there anything you would like to see from WPI regarding free menstrual products?
8. Do you support free menstrual products at WPI? If you feel comfortable, why or why not?

Appendix B3 - Faculty Member 3 Interview Questions

Participant Notice:

Thank you very much for taking time out of your day to be a part of our study. We are a group of students from Worcester Polytechnic Institute in Massachusetts, USA. We are working with PERIOD@WPI and Dean Perlow to explore the potential for a permanent implementation of free menstrual products on campus. We would like to use this information to analyze campus opinions and feedback to fortify our future recommendations. In order to gain the most accurate responses, we will refrain from providing options for representatives to choose from, unless guidance is requested. Your participation in this interview is completely voluntary. You may withdraw your participation at any time. You may also refrain from answering any of the questions.

We will be taking minutes of this conversation - would you prefer to remain anonymous?

If name is provided: May we quote you in our report? If so, may we record you for an accurate transcript?

1. Do you support free menstrual products at WPI? If you feel comfortable, why or why not?
2. Have you considered a free menstrual initiative on campus/menstrual products on campus in general?
3. How do you see WPI implementing a free menstrual product initiative?
4. Were you aware of the C-term trial for free menstrual products? Did you notice them in any restrooms?
5. Did you hear about any students either using or not using the products?

Appendix B4- Facilities Interview Questions

Participant Notice:

Thank you very much for taking time out of your day to be a part of our study. We are a group of students from Worcester Polytechnic Institute in Massachusetts, USA. We are working with PERIOD@WPI and Dean Perlow to explore the potential for a permanent implementation of free menstrual products on campus. We would like to use this information to analyze campus opinions and feedback to fortify our future recommendations. In order to gain the most accurate responses, we will refrain from providing options for representatives to choose from, unless guidance is requested. Your participation in this interview is completely voluntary. You may withdraw your participation at any time. You may also refrain from answering any of the questions.

We will be taking minutes of this conversation - would you prefer to remain anonymous?

If name is provided: May we quote you in our report? If so, may we record you for an accurate transcript?

1. You expressed hesitations, what are your top concerns for us to consider when creating our recommendations?
2. Are there dispensers in gender-neutral bathrooms?
3. Are there any dispensers that are broken?
 - a. Is there any other inside knowledge about the dispensers that we should know about?
4. Are products priced differently across campus? If price was decreased, was there any impact on utilization?

Appendix B5 - Citron Sales Interview Questions

Participant Notice:

Thank you very much for taking time out of your day to be a part of our study. We are a group of students from Worcester Polytechnic Institute in Massachusetts, USA. We are working with PERIOD@WPI and Dean Perlow to explore the potential for a permanent implementation of free menstrual products on campus. We would like to use this information to analyze campus opinions and feedback to fortify our future recommendations. In order to gain the most accurate responses, we will refrain from providing options for representatives to choose from, unless guidance is requested. Your participation in this interview is completely voluntary. You may withdraw your participation at any time. You may also refrain from answering any of the questions.

We will be taking minutes of this conversation - would you prefer to remain anonymous?

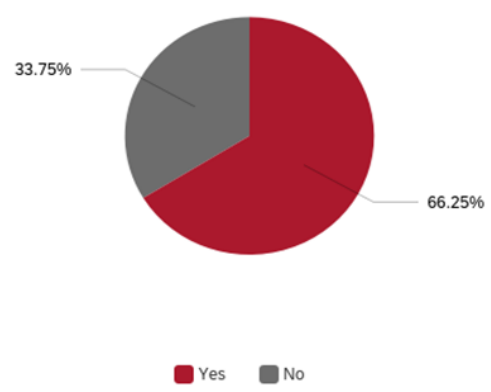
If name is provided: May we quote you in our report? If so, may we record you for an accurate transcript?

1. How much are the dispensers used?
2. What is the average utilization rate for the machines? Might specify units, e.g., # products used/week across campus
 - a. Does the third-party company keep track of products they replace? Do they replace all products? Do they come to restock on a weekly/biweekly/monthly basis?
 - b. Does the contract change with free products?
3. Does every dispenser have products in it at all times? Maybe – Approximately how often do dispensers run out?)
4. Is the utilization rate higher in certain buildings?
 - a. If not all products are replaced at the same time, are there buildings that have higher frequency of needing re-stocking or that have a larger number of products restocked every week/other week/month?
 - b. Rent from you but our facilities service them?

Appendix C- D-Term Survey Distribution and Response Questions Data

Date Distributed	Where/to who?	Approx. # of Recipients
04/21/2020	Individual Friends (Varying Genders)	10
04/23/2020	Chi Omega Women's Fraternity Slack	135
04/23/2020	Phi Sigma Sigma Sorority Slack	150
04/23/2020	Alpha Phi Women's Fraternity Slack	145
04/23/2020	Student Alumni Society Slack	205
4/23/2020	Alpha Xi Delta Women's Fraternity Slack	140
04/23/2020	Alpha Gamma Delta Women's Fraternity Slack	135
4/23/2020	Gompei's Goat Cheese Slack	10
4/23/2020	Crimson Key Slack	108
04/24/2020	Engineering Ambassadors Slack	43
4/24/2020	Individuals (Varying Genders)	15
04/28/2020	Women in Robotics Engineering	34
04/28/2020	Women's Club Lacrosse	33
04/28/2020	Women in CS	67
04/28/2020	Women in Aerospace Engineering	10
04/28/2020	Women in ECE	58
04/28/2020	Women's Club Volleyball	70
04/28/2020	Women's Rugby	62
04/28/2020	Women's Frisbee	19
04/28/2020	Alden Voices	161
04/28/2020	Women's Ice Hockey	30
04/28/2020	Theta Nu Xi	10
04/28/2020	Association for Women in Mathematics	13
04/28/2020	National Association of Women MBAs (grad students)	129
04/28/2020	PERIOD	65
04/28/2020	Ketones A Capella	12
04/28/2020	Technicords	19
04/28/2020	Gender Equality Club	12
04/28/2020	The Alliance	118
04/28/2020	IFC	14

Q1 - Were you aware of the C-term trial for free menstrual products?

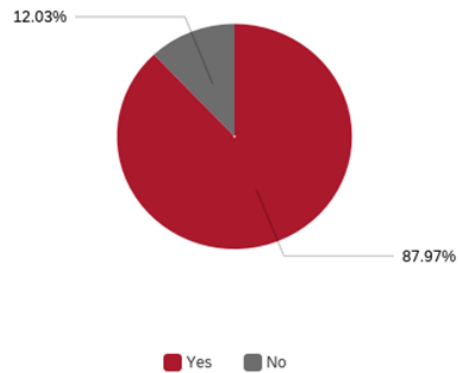


#	Field	Minimum	Maximum	Mean	Std Deviation	Variance	Count
1	Were you aware of the C-term trial for free menstrual products?	1.00	2.00	1.34	0.47	0.22	317

#	Answer	%	Count
1	Yes	66.25%	210
2	No	33.75%	107

	Total	100%	317
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Q2 - Are you a person who menstruates?

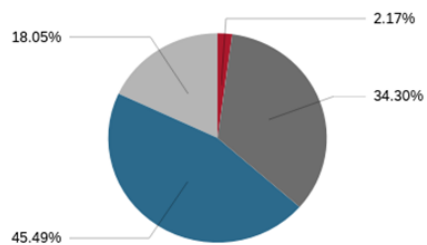


#	Field	Minimum	Maximum	Mean	Std Deviation	Variance	Count
1	Are you a person who menstruates?	1.00	2.00	1.12	0.33	0.11	316

#	Answer	%	Count
1	Yes	87.97%	278
2	No	12.03%	38

Total	100%	316
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Q3 - Is access to menstrual products an issue for you?

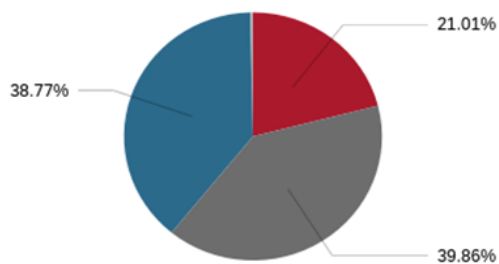


#	Field	Minimum	Maximum	Mean	Std Deviation	Variance	Count
1	Is access to menstrual products an issue for you?	1.00	4.00	2.79	0.75	0.57	277

#	Answer	%	Count
1	Definitely yes	2.17%	6
2	Sometimes	34.30%	95

3	No	45.49%	126
4	Definitely no	18.05%	50
	Total	100%	277

Q4 - Is access to menstrual products an issue for anyone you know?



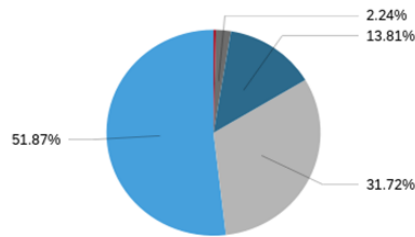
■ Definitely yes
 ■ Sometimes
 ■ No
 ■ Definitely no

#	Field	Minimum	Maximum	Mean	Std Deviation	Variance	Count
1	Is access to menstrual products an issue for anyone you know?	1.00	4.00	2.18	0.76	0.58	276

#	Answer	%	Count
1	Definitely yes	21.01%	58

2	Sometimes	39.86%	110
3	No	38.77%	107
4	Definitely no	0.36%	1
	Total	100%	276

Q5 - How often do you use the menstrual product dispensers in the bathrooms on campus?



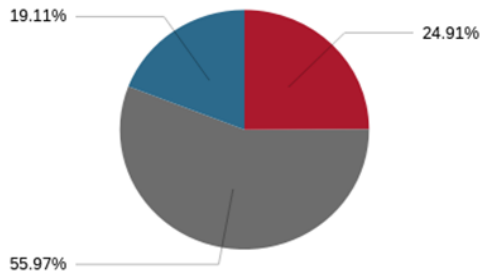
Very Often Often Sometimes Rarely Never

#	Field	Minimum	Maximum	Mean	Std Deviation	Variance	Count
1	How often do you use the menstrual product dispensers in the bathrooms on campus?	1.00	5.00	4.32	0.82	0.67	268

#	Answer	%	Count
---	--------	---	-------

1	Very Often	0.37%	1
2	Often	2.24%	6
3	Sometimes	13.81%	37
4	Rarely	31.72%	85
5	Never	51.87%	139
	Total	100%	268

Q6 - Why don't you use the menstrual product dispensers in the bathrooms on campus?



■ I don't have a need for those products
 ■ I don't carry coins with me
 ■ Other

#	Answer	%	Count
1	I don't have a need for those products	24.91%	73

2	I don't carry coins with me	55.97%	164
3	Other	19.11%	56
	Total	100%	293

Q6 - Open Responses to "Other"

I have sufficient supplies of my own

usually have them with me

i usually remember to bring my own because i don't like the ones provided in the dispensers

They aren't great products

Did not know they existed

As someone who uses tampons, I often vary what sizes I use. The tampons in the dispensers (when there are tampons) are generally not the correct size.

I carry pads with me

I don't menstruated frequently enough to need them regularly

They rarely work and the products from them are not great.

I usually carry my own products with me and when I do need one in the case of an emergency I ask a friend

I carry my own

I didn't know they stocked them

I generally carry spares but their have been times where I have used these dispensers when I forgot to bring a menstrual product

I don't think they are quality products or I don't think the dispensers even work

They are never full.

I carry my own

I carry products with me

I always keep extra pads and tampons in my bag, and I will leave the dispensers for someone who needs it more.

I usually have my own or ask a friend. Only then I would resort to dispensers.

They never have Super or heavy flow products

They mostly don't work

I have products with me

They are really low quality products

i don't have my period due to a birth control implant

the products they dispense do not work for me

I tried to once in an emergency, but it literally didn't work! I used different coins but nothing! I tried breaking into the dispenser, but nothing!!! I was so frustrated and on my period, ugh it was freshman year and I have never used another on-campus dispenser.

I skip my period

I use a menstrual cup

I think they are bad for you because of the chemicals they contain

I always carry my own menstrual products with me

I always keep those products in my backpack

I'll ask a friend first

I always carry my own

I already have my own menstrual products I carry with me

I have a preference for specific products because of allergies, sensitivities, and comfort

I have some in my back pack most of the time so if I have them I use mine

More often than not they are broken :(

I typically have my own with me

I don't

more expensive than buying a pack from the store, I don't know the quality, and I make sure to carry extra with me

I carry my own products with me

Usually carry my own or ask a friend

I don't see them /forget they're there

i'd rather borrow from friends

I just always have products with me if I need them

The products are shitty

I forget they're there

I know I have to pay for them, so I bring my own or ask friends

I don't use that kind it's too thick for me I have a light period

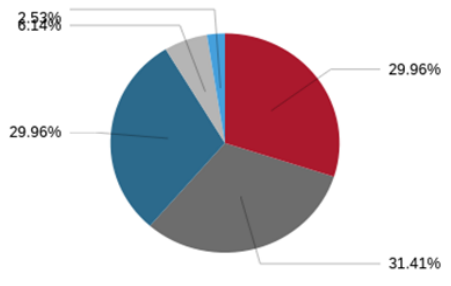
The products in most containers like that (I have not used any at WPI) are very low quality and I am weary about using products when I don't know what they're made of. Most products are not well known brands

I keep menstrual products in my backpack

I bring my own

I usually carry my own products with me

Q7 - How likely are you to utilize free menstrual products in WPI's bathrooms?



Very Likely Likelly Maybe Unlikely Very Unlikely

#	Field	Minimum	Maximum	Mean	Std Deviation	Variance	Count
1	How likely are you to utilize free menstrual products in WPI's bathrooms?	1.00	5.00	2.20	1.02	1.03	277

#	Answer	%	Count
1	Very Likely	29.96%	83
2	Likely	31.41%	87
3	Maybe	29.96%	83
4	Unlikely	6.14%	17

5	Very Unlikely	2.53%	7
	Total	100%	277

Q8 - If you are unlikely/very unlikely to utilize free menstrual products on campus, why?

Q8 - Open Responses:

I always carry menstrual products with me.

No need

I have no need.

I can afford my own menstrual products and often use a reusable menstrual product (menstrual cup) so I would prefer to leave the free products for those who need them.

I use a diva cup and have no need for the products

I often carry my own menstrual products just in cases of emergency

I buy my own and would only use it if it was an emergency and I didn't have one.

I feel bad using them if u can afford them, and the only reason why I would use them is if I don't have one on me

I carry menstrual products with me

I typically carry menstrual products with me

I use a menstrual cup, so I only rarely use pads if it leaks

I use a menstrual cup to reduce the waste of materials and save money

I like having my own products that I can use because not all products are the same and I know what works for me. But if someone is in desperate need of them I think it's great to have.

I'm not comfortable using products I haven't tested before (like cardboard applicator tampons) and am uncomfortable using maxi pads (I'm only comfortable using the thinnest pads possible). While the free products are an amazing idea for those in need, I have the ability to purchase my trusted brands

I would rather ask a friend if I don't have one because of sanitary reasons I trust my friend's rather than one in a basket on the windowsill of a bathroom.

I am able to get my own and wouldn't want to take away from anyone who needs the free products

I only use a cup, which is reusable and better for the environment, so I have no need for disposable menstrual products

I have my own

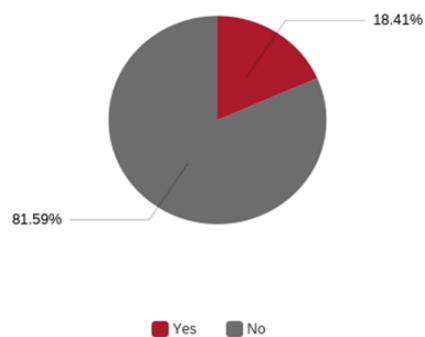
I usually always have my own products with me.

I carry my own

I would only use it if my period came unexpected

I don't use tampons or pads

Q9 - Did you participate in the C-term trial for free menstrual products?

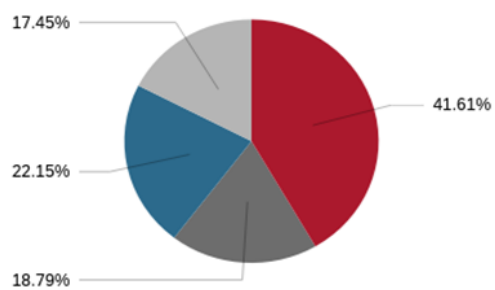


#	Field	Minimum	Maximum	Mean	Std Deviation	Variance	Count
1	Did you participate in the C-term trial for free menstrual products?	1.00	2.00	1.82	0.39	0.15	277

#	Answer	%	Count
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1	Yes	18.41%	51
2	No	81.59%	226
	Total	100%	277

Q10 - Why did you not utilize the free menstrual products in C-term? Select as many as apply.



■ I have my own menstrual products
 ■ I did not need them during C-term
 ■ I was not aware of the trial
■ Other

#	Answer	%	Count
1	I have my own menstrual products	41.61%	124
2	I did not need them during C-term	18.79%	56
3	I was not aware of the trial	22.15%	66

4	Other	17.45%	52
	Total	100%	298

Q10 - Free Responses to "Other"

Was away on IQP

I was not on campus during C-term, though if I was a might have used them if needed

Also the bathrooms they were located weren't places I would usually be at.

I was off-campus

Since they were at select bathrooms around campus, I did not use the bathrooms where the free menstrual products were being offered

Off campus

I was abroad on IQP

I was on IQP

Products were not in restrooms I commonly use.

I didn't know where they were

I was away on IQP

off campus in C-Term

I didn't remember seeing that many around

Was abroad C-Term

I knew that it was happening but throughout the whole term I only saw the free products in 1 bathroom, I did not see them available in the CC or other popular bathrooms

They weren't in the bathrooms I was using

Were not in locations I used

I was on IQP

I was away C-Term

I was away on IQP

I was on IQP

I did not see any free products in the bathrooms

I didn't know how

Was on IQP / not on campus

I was on IQP

I didn't know where they were

I didn't notice them in the bathrooms

I was abroad

I was not on campus (away for IQP).

They seemed to be in the all gender restrooms and I don't use those

I was on IQP

I was not on campus during C-Term

I was not on campus

away on IQP

I was not a student yet

I was not on campus in C-Term

I was away

I was away on IQP

I was off campus (IQP)

Not the kind i prefer to use

I didn't know where to find them

I was not on campus

I couldn't find any at the time

The trial was in limited locations and I do not have classes/meetings in those buildings

I was away on IQP

I wasn't usually in the buildings where the trial was being run

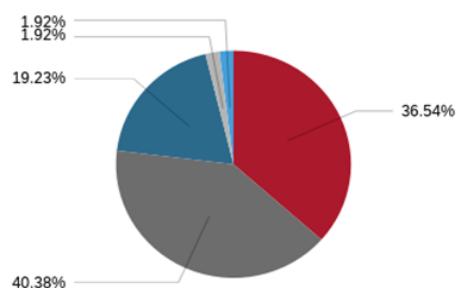
I didn't know if they quality of the product's were good/comfortable

I tend not to use gender-neutral bathrooms, which is where the products were trialed.

I didn't know where they were.

I don't get my period

Q11 - How did you find the trial?



Extremely well Very well Moderately well Slightly well Not well at all

#	Field	Minimum	Maximum	Mean	Std Deviation	Variance	Count
1	How did you find the trial?	1.00	5.00	1.92	0.90	0.80	52

#	Answer	%	Count
1	Extremely well	36.54%	19
2	Very well	40.38%	21

3	Moderately well	19.23%	10
4	Slightly well	1.92%	1
5	Not well at all	1.92%	1
	Total	100%	52

Q12 - Are there any suggestions that you have to improve the free menstrual product system at WPI, if one was to be implemented?

Are there any suggestions that you have to improve the free menstrual product system at WPI, if one was to be implemented?

I think it would helpful to make it easier to obtain the products. I saw the fliers but didn't read into detail since I didn't need them personally. My understanding was that we needed to interact with someone to get the products. If that is the case, I think that could be a barrier for myself and other people due to privacy concerns.

widespread implementation would be needed. very few bathrooms had free products. coins are hard to come by, so that's a barrier for usage. Advertise a lot more please!

Make it more clear that there are free menstrual products in bathrooms. I often see people who are menstruating ask another person for a product rather than instinctively going to a bathroom with them.

N/A

Most of the time when I needed menstrual products, there were no more left in the bathroom. Place free products in each bathroom stall and restock them daily. You can also give out menstrual care packages every month to the female students at WPI and those who need it can collect a care package.

Put the products in every bathroom

Make sure people can pick them up surreptitiously.

Tell people about it

I'm not sure if this was already implemented, but to support our trans students it would be nice if they were in all the bathrooms (mens/womens).

So far, the C-Term trial period was great about keeping menstruation gender-neutral! I hope that if a system is fully implemented at WPI, the system remains gender-neutral, uses strictly gender-neutral language, and offers menstrual products in all restrooms on campus.

Wider awareness, better signs or something so people are more aware

Put them in buildings that students use more like foisie and CC.

Access in every building and in a female, male, and non-gendered bathroom since students of all gender identities may menstruate! (:

N/A

Free in both men and women bathrooms

No suggestions but this is definitely a super idea. I noticed lately that the cost of the products in the dispensers were lowered from like 1.25 to like .30 or something along those lines. Which I was overjoyed over, for everyone's sake. Going free would be so great and a progressive move for WPI!

having a system to make sure products are restocked

Advertising! The more people who know, the better!

Have a large amount where more people use the bathrooms such as the Campus Center, Foisie, and the Library

I would advertise it more if possible! My friends weren't aware of it until I told them about it.

more Frequency of updating the materials??

Nope

one in each building or an online map of where they are

I'd suggest offer more of a variety of products for different flow types

NA

Make the system more known to students on campus, and increase advertising.

No.

Be more active in redistributing based on need. The basket of supplies in the men's rooms in Olin Hall were left virtually untouched throughout the term (at least from my perspective)

Continued progress. More locations, more awareness

Put free products in all academic building restrooms/public buildings.

Make products as discretely available as possible

Make sure they are accessible and available.

Add to both female and gender-neutral bathrooms, not just the latter

I think that the current awareness is good, maybe products could even be put in the men's bathrooms so that guys are also aware and could possibly get some for a friend or girlfriend?

Include them in all bathrooms next!

You guys did a great job!

It might be difficult to get higher quality products as products are expensive, but I never like the items offered. They aren't comfortable and I usually avoid using them if I have to. They are convenient in emergencies, however.

Have the free products in the bathroom rather than in an office somewhere. Also, there are a lot of trans and nonbinary people with periods at WPI, so products in all bathrooms would definitely be appreciated.

Ensuring that everyone is aware of it

Maybe send out an email to highlight that they are there for people to use as a resource

n/a

Put them in more popular bathrooms other than the red center. The CC, SL, Library

Put free menstrual products in every bathroom at WPI

Make more people more aware of it and put it in more well used places like the cc

should be in every bathroom in every building

Have them available in more restrooms on campus

Make both pads and tampons available because I know people who use only one or the other

Maybe promote menstrual cups along with the system it really helps reducing cost if you are struggling to afford menstrual products and not a lot of people know about them

Advertise it better, make sure it is easy, convenient, and discreet

More awareness about the issue, I only know because I have friends involved in implementing the system

Advertise (even if it is a more obvious (colored?) sign above or on the dispenser in the bathrooms itself... not for me but have insight teams mention it?)

Make sure people know about us and they are accessible

n/a

In order to ensure that people do not take more than what is necessary, maybe have WPI somehow connect our IDs to the system. Obviously people shouldn't be frequently but if someone is taking an absurd amount every week, maybe give them a call.

Encouraging people to only use the products when necessary. For example, if you are carrying your own products, use those first, etc.

Options between pads and tampons would be nice. A lot of people have strong preferences for each. Products should also be available in men's bathrooms.

Have them in all bathrooms, send announcement, advertise it (there's no shame in menstruation!), my workplace had a jar of tampons w cardboard applicators that actually really saved me one time.

Better access and awareness how to access

keep an eye on environmental impact. maybe switch to applicator free tampons/organic/fragrance free

Put them in all of the bathrooms; It was rare that I was in a bathroom with menstrual products available when I needed them

Make people aware of it

Different product options (not just pads or tampons but maybe both)

More accessibility

more clarity on the location of the products

available in any bathroom

I completely understand the limited number of locations for the free products, but it would be wonderful to see the program expand to all gender-neutral and women's bathrooms across campus!

Promote- I was completely unaware

You should give it more publicity so people know, and put in all the bathrooms not just some.

Maybe make a little dispenser that only gives out 1 at a time to try and ensure people don't take handfuls (or maybe a basket but it says feel free to donate to this basket with extra products one may have on hand

Making students aware as the locations of free menstrual products and that it is an option that they have.

Maybe make them more visible? Or maybe take a survey of the best/most preferred items, like most ppl at WPI may use super tampons and Regular pads, etc so those are prob the most appreciated to offer

I think that this is a great incentive and could help a lot of people!

Since I was not on campus during the free trial, it's hard to give suggestions since I do not know what was implemented.

I think put them in more bathrooms, I saw the posters and signs but never went into the bathrooms that they were referencing.

put them in the female restrooms

Maybe have the coin operated machines just dispense the products for free, that way people are more likely to take it if they need it in that moment , rather than grabbing it just to have

Too prevent from hoarding of products, make a person scan their school ID and set a limit to an amount they can take a day. Then for guests if they don't have an ID allow for one product to be distributed.

Along with the products put a sign with more description of the program and it's goals

I think I would've used the products if they had been in a different bathroom, I just didn't have many classes in that building. I know it was a trial though, so hopefully they will be able to be in more bathrooms soon:)

Market it more

Some way to keep it sanitary.

Encourage students to only take the products if they need them.

Make sure it's stocked often!

Please promote more! I had no idea this was happening but I'm sure campus could use it. Great advertising would be in freshman dorms.

Coin operated machines are very outdated

Put them in certain bathrooms and have people know they are there, so if they need one they know where to go. Bathrooms like the campus center or Rec center would be a good start.

Maybe put the products in more popular bathrooms.

Maybe put them in a dispenser like the ones for paying but not have people pay for them, so people don't over use

Expand it to more bathrooms on campus

Put them in more buildings/locations. For example the gym

No

Variety of products

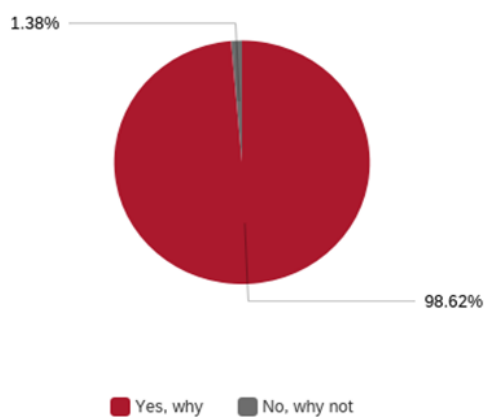
Make sure it is clear that they are free to use (have a sign in restrooms potentially)

All bathrooms on campus wider variety of supplies. (panty liners, sanitary wipes, etc)

Increase awareness of free menstrual product system / Place products in every bathroom

I don't have any suggestions but I fully support this and I think it is important for our campus

Q13 - Do you support free menstrual products at WPI?



#	Field	Minimum	Maximum	Mean	Std Deviation	Variance	Count
1	Do you support free menstrual products at WPI? - Selected Choice	1.00	2.00	1.01	0.12	0.01	289

#	Answer	%	Count
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1	Yes, why	98.62%	285
2	No, why not	1.38%	4
	Total	100%	289

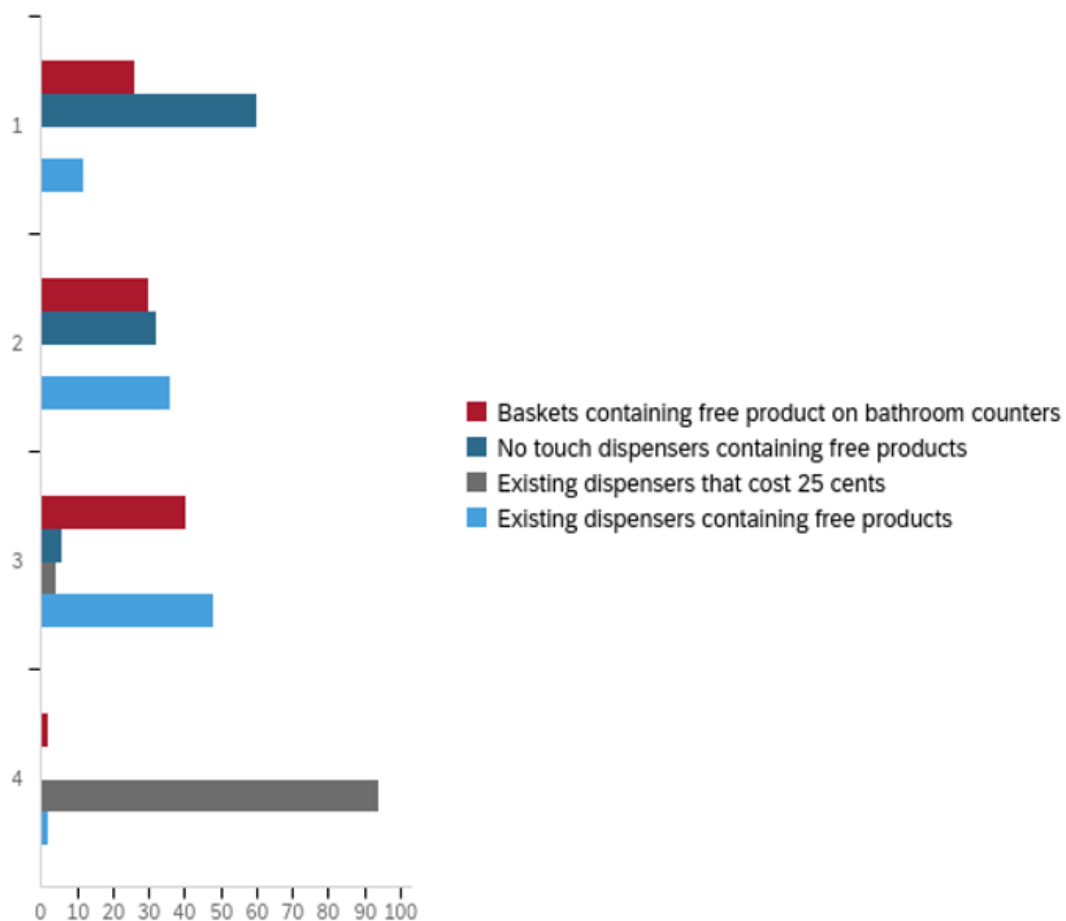
Appendix D- A-Term Survey Distribution and Response Questions Data

Date Distributed	Where/to who?	Approx. # of Recipients
09/03/2020	Chi Omega Women's Fraternity Slack	107
09/03/2020	Phi Sigma Sigma Sorority	110
09/03/2020	Alpha Phi Women's Fraternity	105
9/6/2020	Alpha Xi Delta Women's Fraternity Slack	100
9/3/2020	Gompei's Goat Cheese Slack	10
9/3/2020	Crimson Key Slack	109
09/03/2020	Engineering Ambassadors Slack	64
09/03/2020	Women in Robotics Engineering	34
09/03/2020	Women's Club Lacrosse	33
09/03/2020	Women in CS	67
09/03/2020	Women in Aerospace Engineering	10
09/03/2020	Women in ECE	58
09/03/2020	Women's Club Volleyball	70
09/03/2020	Women's Rugby	62
09/03/2020	Women's Frisbee	19
09/03/2020	Alden Voices	161
09/03/2020	Women's Ice Hockey	30
09/03/2020	Theta Nu Xi	10
09/03/2020	Association for Women in Mathematics	13
09/03/2020	National Association of Women MBAs (grad students)	129
09/03/2020	PERIOD	65

09/03/2020	Ketones A Capella	12
09/03/2020	Technicords	19
09/03/2020	Gender Equality Club	12
09/03/2020	The Alliance	118
09/03/2020	IFC	14
09/03/2020	Society of Women Engineers	424

Q1 - Please rank these options regarding menstrual product distribution (1 = most desirable, 4 = least desirable).

**Please rank these options regarding menstrual product distribution
(1 = most desirable, 4 = least desirable).**



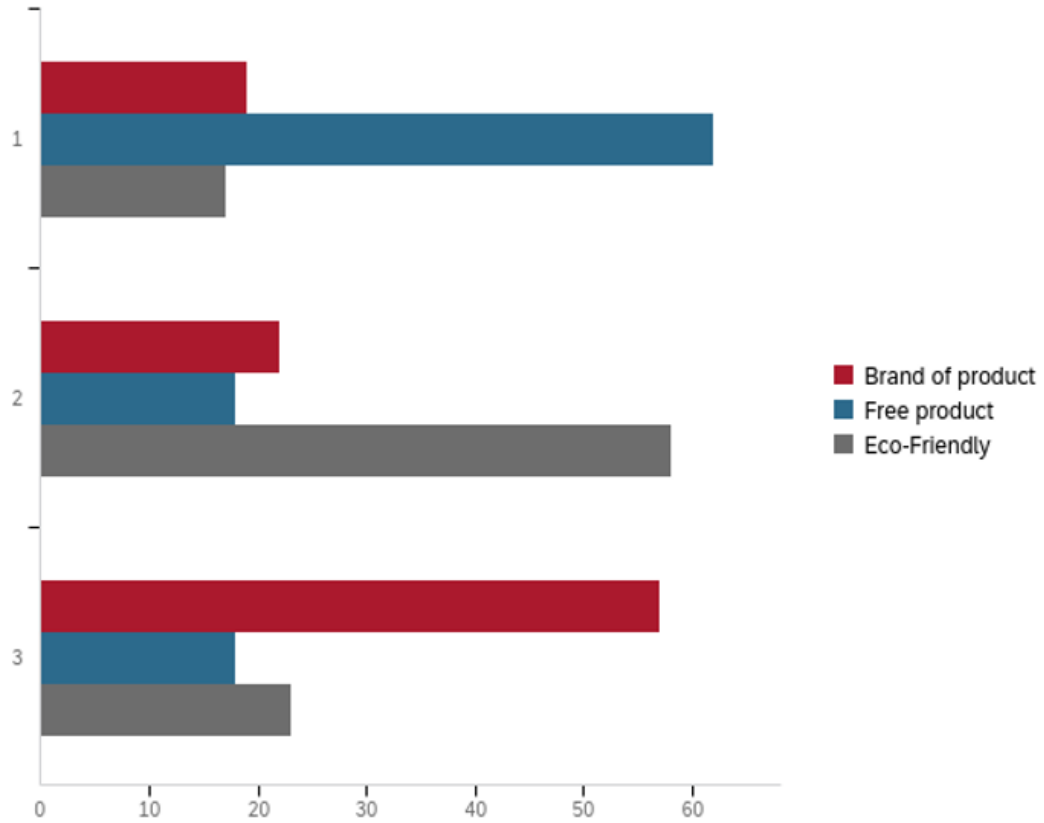
#	Field	Minimum	Maximum	Mean	Std Deviation	Variance	Count
1	Brand of Product	1.00	3.00	2.39	0.79	0.63	98
2	Free Product	1.00	3.00	1.55	0.78	0.61	98

3	Eco-Friendly	1.00	3.00	2.06	0.64	0.40	98
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#	Field	1		2		3		Count
1	Brand of Product	19.39%	19	22.45%	22	58.16%	57	98
2	Free Product	62.27%	62	18.37%	18	18.37%	18	98
3	Eco-Friendly	17.35%	17	59.18%	59	23.47%	23	98

Q2 - Please rank these choices regarding menstrual products in order of importance to you (1 = most important, 3 = least important).

Please rank these choices regarding menstrual products in order of importance to you (1 = most important, 3 = least important).



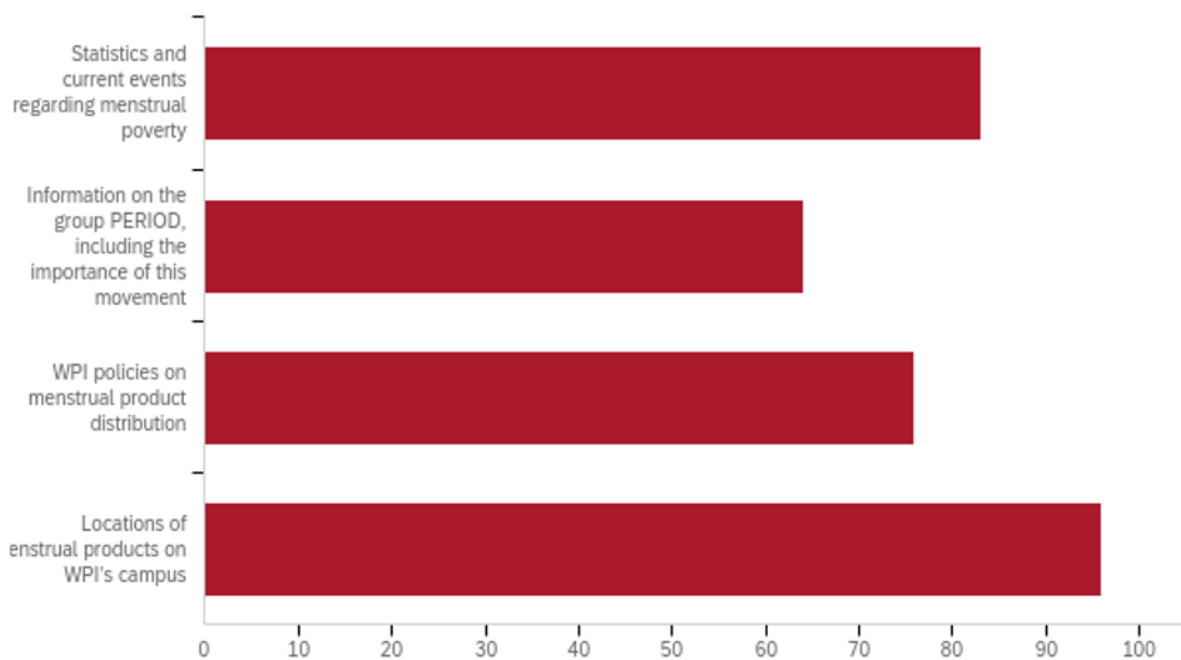
#	Field	Minimum	Maximum	Mean	Std Deviation	Variance	Count
1	Baskets containing free products on bathroom counters	1.00	4.00	2.18	0.85	0.72	98
2	No touch dispensers containing free products	1.00	3.00	1.45	0.61	0.37	98

3	Existing dispensers that cost 25 cents	1.00	4.00	3.96	0.20	0.04	98
4	Existing dispensers containing free products	1.00	4.00	2.41	0.73	0.53	98

#	Field	1		2		3		4		Count
1	Baskets containing free products on bathroom counters	26.53%	26	30.61%	30	58.16%	57	2.04%	2	98
2	No touch dispensers containing free products	61.22%	60	32.65%	32	6.12%	6	0.00%	0	98
3	Existing dispensers that cost 25 cents	0.00%	0	0.00%	0	4.08%	4	95.92%	94	98
4	Existing dispensers containing free products	12.24%	12	36.73%	36	48.96%	48	2.04%	2	98

Q3 - What would you like to see from an educational campaign regarding menstruation? Check all that apply.

**What would you like to see from an educational campaign regarding menstruation?
Check all that apply.**

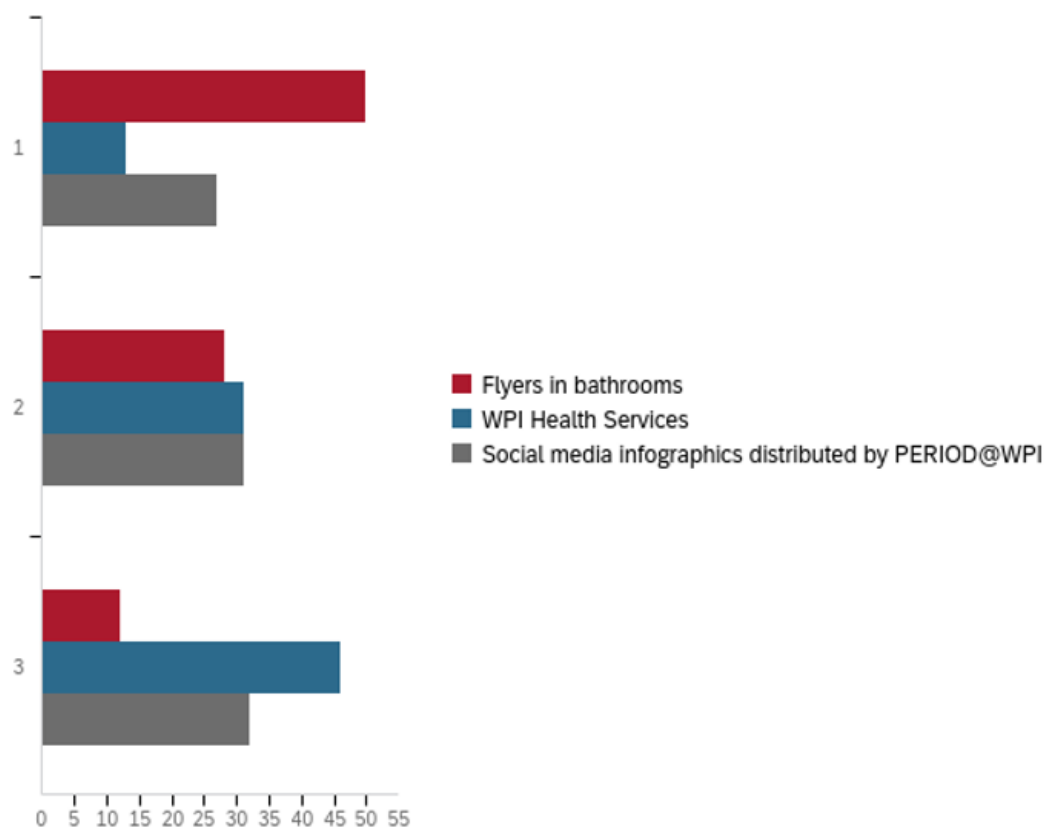


#	Field	Count
1	Statistics and current events regarding menstrual poverty	25.02% 83
2	Information on the group PERIOD, including the importance of this movement	20.06% 64
3	WPI policies on menstrual product distribution	23.82% 76

4	Locations of menstrual products on WPI's campus	30.09%	96
			319

Q4 - How would you like to be presented information regarding menstruation? Rank from (1 = most desirable, 3 = least desirable).

How would you like to be presented information regarding menstruation? Rank from (1 = most desirable, 3 = least desirable)



#	Field	Minimum	Maximum	Mean	Std Deviation	Variance	Count
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1	Flyers in bathrooms	1.00	3.00	1.58	0.71	0.51	90
2	WPI Health Services	1.00	3.00	2.37	0.72	0.52	90
3	Social media infographics distributed by PERIOD@WPI	1.00	3.00	2.06	0.81	0.65	90

#	Field	1	2	3	Count			
1	Flyers in bathrooms	55.56%	50	31.11%	28	13.33%	12	90
2	WPI Health Services	14.44%	13	34.44%	31	51.11%	46	90
3	Social media infographics distributed by PERIOD@WPI	30.00%	27	34.44%	31	35.56%	32	90

Appendix E- Faculty and Staff Interview Table and Summaries

Date	Interviewee	Title
4/17/2020	Professor 1	Assistant Professor, Industrial Engineering
4/20/2020	Professor 2	Assistant Teaching Professor,

		Humanities and Arts,
4/20/2020	Professor 3	Director, WCPC
4/21/2020	Professor 4	Associate Professor, Business & Management Engineering
4/21/2020	Professor 5	Associate Teaching Professor, Industrial Engineering
4/21/2020	Faculty Member 2	Anonymous
4/23/2020	Faculty Member 3	President, WPI
4/23/2020	Professor 6	Professor of Practice, Chemical Engineering
4/24/2020	Faculty Member 4	Associate Director, Operations, Career Development Center
4/24/2020	Professor 7	Assistant Teaching Professor, Mechanical Engineering
4/28/2020	Faculty Member 5	Associate Director, Buildings & Events, Facilities
4/28/2020	Faculty Member 6	Assistant Director, Academic Advising

Appendix E1 - Faculty Member 1

April 17th, 2020, 4:30PM – 4:40PM

The interview was led by Emily and lasted for about 10 minutes. Questions asked are outlined in Appendix C. The following is a summary of our video-conference interview.

The faculty member began by giving our team an overview of WPI's past efforts to support menstrual equality, noting that many of the university buildings were not initially designed with both male and female restrooms in mind, being that the university was a men's institution. The Recreation Center was the first building to have a gender-neutral bathroom specifically included in its design. Even as the campus has adapted to having men and women on campus, many buildings only have one women's restroom with a dispenser.

About a year before our project began, a student brought the issue of accessibility of products to the Associate Dean in regards to those whose gender identity may hinder them from accessing the products they need in some way, as well as the price-point of the products on campus. There are a multitude of health risks associated with alternatives that a person may take in order to overcome these barriers. For an initial first step, all dispensers on campus were reduced to a \$0.25 fee. A conversation was begun with PERIOD, surrounding the interest for free products on campus, especially in female-identified restrooms, as well as the usage in gender-neutral or male-identified restrooms.

She noted that there were concerns surrounding the labor costs associated with providing products and urged our team to consider these costs throughout our project, as well as to produce a cost comparison of the current offering against any alternatives.

She stated that she did not think there was any general knowledge of the free trial in C-Term, but posited that faculty and students alike would only take product from a free trial when they were in a "no-choice situation", and that could have led to low recorded usage as well.

We ended our interview with her stating that she supports this initiative because it is one small convenience that is medically-necessary, and that the school could offer students that is low-cost in the grand scheme of things.

*Appendix E2 - Interview with Professor 1***April 17th, 2020, 4:30PM – 4:40PM**

The interview was led by Emily and lasted for about 10 minutes. Questions asked are outlined in Appendix B. The following is a summary of our video-conference interview.

She is a fourth-year assistant professor, teaching in the industrial engineering discipline at WPI. Before becoming aware of the C-Term trial, she saw free menstrual products in the recreation center in one of the bathrooms and used one. Later, when she was in Salisbury Labs, she saw a notice that there was such a program on campus. As the trial was only one term, she felt there was very little time for it to be discussed or talked about between students or other faculty members. When asked how likely she was to use free products, Saberi said that the products are good in emergency situations. She didn't have her bag with her in the rec center and appreciated products being there and available.

Appendix E3 - Interview with Professor 2

April 20th, 2020, 6:00PM – 6:30PM

The interview was led by Sydney and lasted for about 20 minutes. Questions asked are outlined in Appendix B. The following is a summary of our video-conference interview.

She is in her 2nd-year as a professor in the Humanities and Arts department at WPI. While she wasn't aware of the C-Term trial due to being away on IQP, she had plenty of feedback for our team. Due to her absence on campus during the trial, our team omitted questions 2, 3 and 6.

Depending on the type of product available, she said she would use free menstrual products. She would appreciate name-brand products but wouldn't use them herself, as she prefers organic products. She made sure to note that despite this, she would absolutely welcome the presence of free products and said that the immediate goal of just having access to something would be great.

When asked about what she would like to see from WPI regarding free products, she emphasized that an implementation could demonstrate WPI's commitment to the students, staff, faculty and administration who require those products regularly and could show that WPI is striving towards an image of equality. She also mentioned the inevitability of those who would not necessarily support this initiative who might ask as to why we need this. Her response was why do we *not* need it? Why would a person have to go home and miss class, a group meeting, or work just to get something that probably should have been there anyway?

She explained that the motivation behind this program is “just a good thing to do”. She also introduced the idea that this initiative could be a great PR tool for WPI, stating that “on a STEM campus where women are still trying to get equality in terms of numbers, it's a good message to send that we respect those, even though they are in a minority position, we respect them enough to offer things that they are going to need that other bodies are not going to need. Because our bodies are not the norm, there needs to be some public education about why this is important in the first place. There may be some people who say why are we singling out one group as opposed to something the entire campus needs. And [her] response is, is there really one thing that the entire campus needs? We're all different and this is something that one group of us needs.”

She sees this project as a good opportunity to do some of that public education about the diversity that we have on campus and, not only here, but moving forward as well. She discussed her new course on campus regarding feminism in STEM and explained its relevance for members of the WPI campus who are not male. “You need to know enough to set precedent. You need to know enough and be respectful enough to change the course, change the way that it currently works, so that we are more inclusive. So that's another reason that public education around something like this could be really positive for WPI in general.”

“What [women and those that identify as women]’ve been taught to do, what we've been enculturated to do, is to just stay quiet as possible. Don't question our presence here, let's just be grateful, let's just go with the flow, as opposed to hey, no, we're here and we're a vital part of this community and we should be included and respected. We're not asking for anything that

anyone else doesn't get, but we are *asking* for what everyone else gets. And so, I think this is a great way of saying hey no we're here and we deserve equality in all its different iterations.”

Appendix E4 - Interview with Professor 3

April 20th, 2020, 6:30PM – 6:45PM

The interview was led by Emily and lasted for about 15 minutes. Questions asked are outlined in Appendix B. The following is a summary of our video-conference interview. Due to her absence on campus in C-Term, questions 3 and 4 were omitted.

She has worked at WPI for six years and is the Director of the Worcester Community Project Center as a part of IGSD. While she was not on campus for C-Term due to being abroad for IQP, she was aware of the trial, as Sydney was abroad in Morocco with her. When asked about how likely she was to use free products, she stated that she “would use them if she had an emergency in which she needed them at the moment”. She gave her support of the initiative, citing that there was “certainly a need, particularly more so for students. If [she] does, [she] has co-workers to ask, but students who live off-campus may not have the easy network of people to ask for help. Especially since [she] is not sure where Health Services is located.” Our team confirmed that Health Services is, in fact, located off-campus, which she noted was different from her time as an undergrad at University of Connecticut, where the Health Center was directly on campus. She asserted that she would much prefer name-brand products to generic cheap knockoffs, but also products that were sustainable: products without plastic applicators for tampons, for example.

Our team inquired more about her inclination for brand-name products and she rationalized that “if [she] didn't know the brand name, [she] would wonder about safety of using it.” She also noted that there has been more research in the media recently regarding hazardous toxins in tampons and mentioned that people may be more likely to use a product if it's a brand they can trust as opposed to something that's not safe.

We also asked if she would experience a difference in willingness to use products if they were in a dispenser and she agreed that she wouldn't care if it was only pads or only tampons if it was an emergency, but noted that if it was in a dispenser and one would have to pay for it, she would be less likely to pay for it. She noted that she would only look to a dispenser if she really needed it.

Appendix E5 - Interview with Professor 4

April 21st, 2020, 1:00 PM - 1:15 PM

The interview was led by Sydney and lasted for about 15 minutes. Questions asked are outlined in Appendix B. The following is a summary of our video-conference interview.

She is a professor in The Foisie Business School. She teaches graduate marketing courses and worked in the menstrual product development industry prior to her time at WPI. Her experience in the menstrual product industry is a major reason she was chosen to be interviewed. She has worked at WPI for almost nine years.

She was aware of the C-Term pilot trial, but only at the end of C-Term. She heard students talking about it and noticed flyers around campus.

She was unsure if students were using the products, but she did overhear conversations about students discussing the free product offerings.

She noted that she was not aware of how the free product trial was marketed to students. She noted that marketing it correctly to gain student awareness is a key aspect to include for the trial. She noted that it is key to get rid of the negative taboo around using menstrual products, which can be done with the proper marketing of the free offering on campus. She explained how younger girls can feel embarrassed and uncomfortable about using products, so by offering them for free we will become an inclusive campus combating these stigmas for all.

She thinks offering menstrual products for free on campus is great because of how costly this can be for students. Students with heavier periods are forced to spend a lot of money on products every month. Additionally, it adds a convenience factor for students and faculty as well. She emphasized that the products at WPI should be free and available at all times, in the most public bathrooms (campus center) as well as private bathrooms (such as dorms). She also noted the importance of protecting them so that people cannot tamper with them. Clear signage to show that the products are available for free is also necessary so that students and faculty are encouraged and feel comfortable using them.

Although she noted that she would not have a personal need for the products, she would be more than willing to suggest using them to students and faculty if they needed them.

The products should be available for anyone, not just students, especially after working hours. While faculty would be comfortable asking for them from each other, they should be offered for them as well.

Appendix E6 - Interview with Professor 5

April 21st, 2020, 2:00 PM - 2:15 PM

The interview was led by Rachael and lasted for about 15 minutes. Questions asked are outlined in Appendix B. The following is a summary of our video-conference interview.

He has been affiliated with WPI since 1979 when he was a student. In 1998, he started teaching some courses, but did not become a full-time employee until 2008. He currently teaches business and industrial engineering courses in The Foisie School of Business.

He was not aware of the C-Term trial for free menstrual products, and he did not notice them in any restrooms. He noted that he does not know where any gender-neutral bathrooms are on campus, which is where some products were placed. He also noted that he has not heard anything about the free menstrual product initiative on campus in general.

He did not hear about any students using the products or discussing the trial.

When asked if there is anything he would like to see from WPI regarding free menstrual products, he discussed how if toilet paper is free, menstrual products should be as well. He noted that his wife expressed that she was surprised that the school would be willing to offer them for free, as she has had to pay for them her entire life and did not expect that to change. He made the point that half of the population uses this product for everyday life, so it would be relevant to campus. Additionally, for equity to increase, there does not need to be an exact match or substitute offering for males.

He does not have any personal reservations about WPI spending money on this for half the population. When asked if he supports this initiative on campus, he said “of course”.

When asked if he had any thoughts or opinions on if products should be provided in male restrooms for students that menstruate but identify as male, he expressed that question of if the student would feel comfortable using/taking the products in front of others. He also noted that if it became a law, it is what it is and people would have to adapt. He made the interesting point that on WPI’s campus, he does not believe anyone would be discriminated against for using the product in a male-identified restroom. He stated that at WPI, you meet a lot of people different from you, and that our campus is very conservative in the grand scheme of things.

Appendix E7 - Interview with Faculty Member 2

April 21st, 2020, 2:30 PM - 2:40 PM

The interview was led by Emily and lasted for about 10 minutes. Questions asked are outlined in Appendix B. The following is a summary of our video-conference interview.

The staff member became affiliated with WPI in the 1980s when she got her graduate degree. In 2003, she returned to campus as a staff/faculty member. She retired in January of 2020.

She did notice some free menstrual products in some restrooms on campus, but she was not aware of the free trial. She did not hear any discussion regarding the free menstrual product trial from students, nor did she discuss it with them.

She does not have a personal need for the products, but she noted that as a student she would very much appreciate free menstrual products being offered. She noted specifically that periods can sneak up on you, so having access in public bathrooms would be great.

She had not heard about anything regarding the free trial and other efforts on campus until we asked her to interview with us.

When asked if there is anything she would like to see regarding the menstrual product distribution, she expressed concern that people would take advantage of the free products.

She suggested utilizing student IDs to gain access to the products in the restrooms, regardless of if they cost money or not. This would deter students and faculty from taking advantage of the free products, but it may limit visitors from using the products.

She expressed that she supports free menstrual products on campus. She noted that it is important that both pads and tampons be offered to cater to a wider audience. She recommended that if this initiative moved forward to test how much product would be taken from specific locations. She expressed that she does not think that this initiative is absolutely necessary, but it would increase the equity present on campus. This is a distinct effort WPI could take to make females feel more comfortable on campus.

Appendix E8 - Interview with Faculty Member 3

April 23st, 2020, 9:45 AM - 10:00 AM

The interview was led by Emily and lasted for about 15 minutes. Questions are outlined in Appendix B. The following is a summary of our video-conference interview.

In theory, I support free menstrual products at WPI. In practice, I need to understand a lot more about the costs involved and exactly how it works and what the expectations and norms are. Most every dollar we spend is a dollar that one of your families is paying us and so I'm always extra sensitive on what we're paying for and what we're not. That being said, I want to look at what benchmarks - what do peer institutions do? What are[sic] the five competitors that we lose students to do? What are[sic] the other colleges in Worcester do? And so, make sure we are at least aware of best practices and then we make a super informed decision. But yes, at least in theory, I am absolutely supportive of the concept.

I have not, this is actually the first time that it's been raised to me. But that's probably true of a lot of different initiatives that are related to specific student needs on campus - things like bike shares or food insecurity. I'm always happy to get new ideas in this way.

My sense is that it's something we would do - its like basic toiletry products, and we have basic toiletry products that we provide, and so we would probably do it along with that in women's restrooms at least as a first start, or gender-neutral restrooms which we're moving to more an more on the campus. That would be my initial thought.

I don't think I was, I'm really happy to hear it.

*Appendix E9 - Interview with Professor 6***April 23st, 2020, 4:30 PM - 4:40 PM**

The interview was led by Emily and lasted for about 10 minutes. Questions asked are outlined in Appendix B. The following is a summary of our video-conference interview.

He was a student at WPI in 1976, and has worked at WPI since 2013.

He was aware of the C-Term free menstrual product trial. He observed signage in the Campus Center that informed him about the trial. He did not notice them in any gender-neutral restrooms. He also did not hear about any students either using or not using the products.

Please note that the usage questions were omitted from this interview.

He does not know much about WPI's free menstrual product initiative because it does not directly relate to him, but he is aware that WPI is trying to make them more widely available.

He thinks this is a "phenomenal" initiative that is needed for society, and therefore it should be advertised better on campus. This initiative will show that WPI is a community that cares about each other. He fully supports this initiative and thinks it is good to see the WPI community coming together for this issue. He noted that this initiative is similar to the gender-neutral bathroom implementation on campus.

He noted that as this does not directly impact him, he does not have many ideas for implementation. He hopes, however, that it will be as successful as the gender-neutral bathroom project on campus. He hopes that the campus continues to exhibit wide support for these types of projects.

He had follow-up questions about the roll out of our survey, as well as about the development of our project in A-Term.

*Appendix E10 - Interview with Faculty Member 4***April 24th, 2020, 4:00 PM - 4:05 PM**

The interview was led by Rachael and lasted for about 5 minutes. Questions asked are outlined in Appendix B. The following is a summary of our video-conference interview.

She has worked at WPI for 6 years.

She was not aware of the C-term trial on campus.

She would be more likely to use free products in the gym, locker room, or by the pool. She's less likely in the actual office, because she has her own inventory in her office but not in her gym bag.

She doesn't know anything about free menstrual products. She wasn't even sure she's ever really noticed what's available in the restrooms and across campus. In the CDC, when she first began working there, there were specific rules about where to throw products out (not in the stall like now)

She would like to see the distribution of free products in general.

Definitely yes, I don't see any issues with the alternative. It would be cool to share with the community if it works on campus.

*Appendix E11 - Interview with Professor 7***April 24th, 2020, 4:30 PM - 4:40 PM**

The interview was led by Rachael and lasted for about 10 minutes. Questions asked are outlined in Appendix B. The following is a summary of our video-conference interview.

She has worked at WPI for five years.

She was aware and saw them in the library restrooms. "Literally no one's going to have a coin."

She did not hear anything from students about the trial.

She believes it's a very important thing to do. Even though we are at a private school, there are plenty of students that are not affluent and do not have access to products.

She probably wouldn't use products because she would leave them for people who need them. She might use them if there was an emergency or if she didn't have any on her.

She knew about the library bathroom and that there are several quarter-operated machines in Higgins. She has noticed that some bathrooms have the brown bags and some bathrooms only have one bag that everyone is supposed to put products in.

Anything that could reduce plastic waste, having information about eliminating one-time use products. Research into what could be best environmentally. It might be worth having some research to back the movement if any students who may not menstruate raise issue with supplying products

Important for students who cannot afford products. Even if you're on-cycle you should be able to attend class. Please only take what you need, when you need it.

Question for us: Is our goal to do research or to get products into bathrooms? Our goal is to have products offered on campus to create equity but we are doing a lot of research.

Appendix E12 - Interview with Faculty Member 5

April 28th, 2020, 2:00 PM - 2:20 PM

The interview was led by Sydney and lasted for about 20 minutes. Questions asked are outlined in Appendix B. The following is a summary of our video-conference interview.

Often on campus, if things aren't "just right" facilities will receive a lot of complaints and phone calls that can be accusatory at times. Terry is apprehensive about theft of product (which would decrease the product immediately), which would result in angry phone calls to facilities. Additionally, if the basket is taken, facilities would have to replace the baskets. Would they be getting multiple calls per day if it is a high traffic area? He is also worried about this interrupting their other work on campus.

Terry believes that the fee WPI currently pays is only to rent and stock the machines, not for the actual product. He thinks continuing to use the third-party (and the machines) will make facilities lives easier, as well as deter people from stealing. He would favor providing the product for free through the vendor.

Terry is skeptical that the vendor even keeps track of how much product they dispense. The sales representative mentioned to Terry that some schools they service do offer the products for free in the dispensers, with restocking from the third-party. Terry emphasized that at first people may take a lot of product, but as time goes on the demand will normalize.

There are 23 machines on campus, which are likely only able to be serviced by the vendor. Price is the main focus from WPI at this time.

There is one dispenser in rec center (family bathroom) on first floor, one in Foisie in the gender-neutral restroom

He is unsure if any dispensers are broken. The third-party vendor makes sure everything is working with the machines every two weeks. Terry noted that this has not been a frequent issue.

The price decrease is all across campus, in every machine.

Terry thinks we should Zoom call with the third-party before anything else to see what the options are for restocking the machines - explore possible cost reductions.

Terry thinks this is a great cause, and he isn't sure why this has taken so long to implement.

Appendix E13 - Interview with Faculty Member 6

April 28th, 2020, 3:30 PM - 3:40 PM

The interview was led by Rachael and lasted for about 10 minutes. Questions asked are outlined in Appendix B. The following is a summary of our video-conference interview.

She has worked at WPI for four years.

She was aware of the C-term. She was aware of PERIOD@WPI but not the C-Term trial and did not hear anything about it from students. She runs the Academic Advising instagram and has seen PERIOD@WPI's account but nothing specific regarding students using the trial.

It's something people don't think about. Her office is located in Daniels Residence Hall but she is typically well-stocked. In the times she is not, it would be super helpful instead of having to go to the campus bookstore or search for a quarter in her bag. It would be great in times of need, but not for every day.

She believes most bathrooms have the dispensers and that they are \$0.25 to \$0.50, but she hasn't seen baskets or free products. Additionally, she is aware that PERIOD@WPI is a student organization increasing menstrual awareness on campus.

She thinks it's something we should be doing. There's a brewery that has products in all their bathrooms and has seen it popping up in places recently. It's a "no-brainer".

People don't know the access that others have. If people don't have cars, they can't always go grab and buy their own products. Assumptions that we make that people have access readily to these products.

Appendix E14 - Supplier Interview with Citron Hygiene Sales Representative

April 30th, 2020, 11:00 AM - 11:15AM

The interview was led by Sydney and lasted for about 15 minutes. Questions asked are outlined in Appendix B. The following is a summary of our video-conference interview.

The sales representative has worked for Citron for 17 ½ years and is a sales representative.

She doesn't have an exact amount for how much the dispensers are used, and it varies from location to location. Some dispensers are in an area where they might not be used as frequently, but then, there could be an event that happens in that area and then there's more usage. Citron doesn't typically have its employees keep track, but she was open to asking them to do that.

Due to this, she didn't have specific information on utilization. She did inform us that the service technicians may have that information. She also alerted our team that utilization would vary between dispensers with charge vs. dispensers that were free. Currently, Citron does work with campuses that offer products for free, namely Northeastern and Brandeis, which made the switch to free products recently. Citron has also joined in on Menstrual Day in May and she will provide information on that to us as to what the company has done for menstrual awareness.

The price on units usually changes: Citron calculates the units (products) used per year, which is around \$300/unit. She said she would get our team exact numbers in an email correspondence. She also noted that if no-charge dispensers are installed, it is typical to experience the product disappearing quicker, but that it does calm down. In contrast, with baskets, products will be gone in hours.

Per dispenser, there are approximately 24 pads and 24 boxes with 2 tampons per dispenser.

We asked about potentially renting machines from Citron but having our facilities staff do the stocking. She informed us that Citron usually does not do this, because the price includes servicing and maintenance, as well as stocking.

She also informed us that if we were to switch to free dispensers and saw a huge up-tick in use, they would begin to monitor usage. Facilities would call Citron about the stockouts and the dispenser would be serviced within 24 hours. She did add that she has not seen this issue, especially not on the Northeastern or Brandeis campuses.