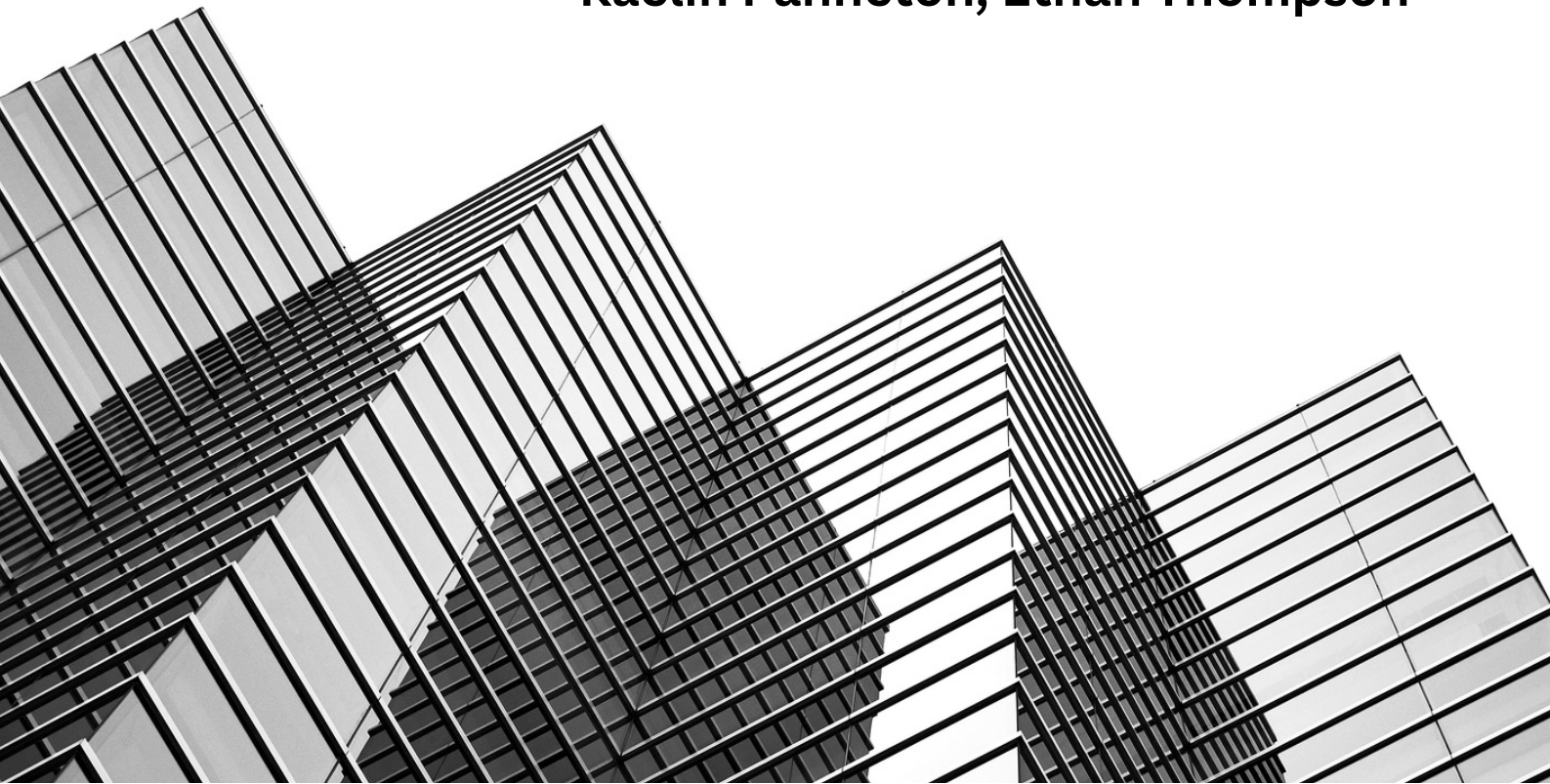




Freie Universität Berlin

# INTERACTIVE SUSTAINABLE CAMPUS TOUR

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**WPI**

Freie Universität



Berlin

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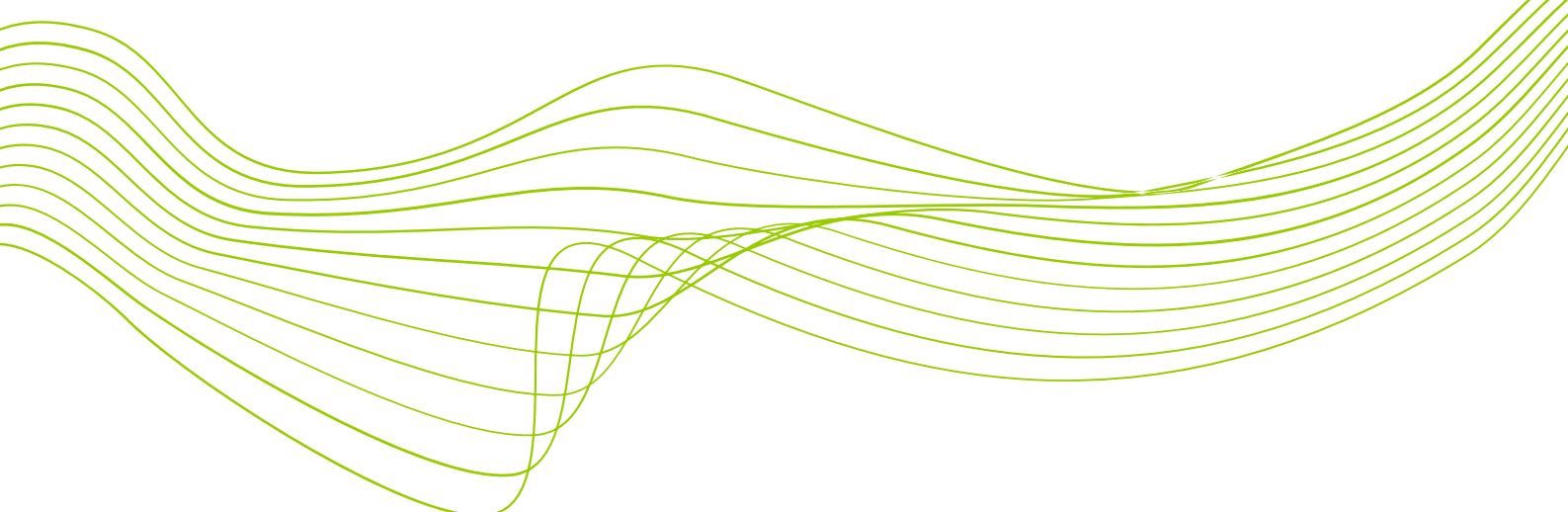
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An Interactive Qualifying Project submitted to the Faculty of Worcester Polytechnic Institute in partial fulfillment of the requirements for the Degree of Bachelor of Science.

# Abstract

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The Free University of Berlin is a public research university located in Berlin, Germany which is known primarily for its program offerings in political science and the humanities. FU-Berlin also maintains a strong program in areas of environmental engineering and overall sustainability. Currently, FU-Berlin offers a public sustainability tour that the campus utilizes for advertising the sustainability highlights to visitors but there is a lack of interest in completing the tour. The project team has been tasked with developing a more interactive campus tour using the platform Actionbound, an app for developing and playing digital scavenger hunts so that students are more inclined to try it.

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# Sustainability Education

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This project investigated the problem that the current sustainability campus tour at the Free University of Berlin has of not engaging the student body in the way that the faculty hoped for. The current tour is a webpage that displays a map of different stops and each stop contains an audio description and a picture of the location. This does not allow for much user interaction, as someone taking the tour can simply sit in one spot flipping through the stations without really engaging with the location or the material.

This is important because the university has many sustainable initiatives, but there is a communication gap between what the university wants the students to take away from these initiatives and what information the students are actually gaining.

We as a team set out to build a new interactive tour that is targeted toward a student audience. We used the platform Actionbound to create a tour full of GPS location stops, multiple-choice quizzes, and other types of input. Our goal was to create this experience and then run different stages of feedback in order to make sure we were providing the best experience for the user.

Throughout this process, the team has used many methods to achieve our goals. Some of these methods include hosting focus groups and interviews, along with some user testing towards the end of the project to gain feedback. We hoped getting input from different areas of students on campus, both sustainability involved and less sustainability involved would help us gear the interactive experience towards all students.



# Background

## Sustainability in Germany



Figure 1: Sustainable development goals (SDGs)<sup>[10]</sup>

## Introduction

In order to combat the massive threat of climate change, it is becoming ever more important to enact measures to educate the general population on the importance of sustainability. As a leader in sustainability, Germany excels in all of the sustainable development categories designated by the United Nations. This trend, also adopted by German universities, meets goals in its successful implementation through student organizations, programs, research, and conscientious energy usage. It is now the responsibility of universities to not only continue on this path, but to also better understand and develop interactive education. In order to improve communication with students and mold future leaders and decision makers to value the development of environmental sustainability, universities can take advantage of the engagement and effectiveness that comes with the implementation of interactive education.

Germany demonstrates their commitment to sustainability through the many sustainability-focused citizen science projects occurring across the country. Citizen science is when citizens are involved in research processes by performing scientific tasks, such as collecting data. One article highlighting these citizen science projects<sup>[25]</sup> depicted that 12 out of the 17 sustainable development goals (SDGs) proposed by the UN, as shown in Figure 1, were addressed by one or more of the 127 projects studied. The two SDGs which were most prevalent were Life on Land (SDG 15) and Quality Education (SDG 4) while the ones which did not appear were Affordable and Clean Energy (SDG 7), Decent Work and Economic Growth (SDG 8), Reduced Inequalities (SDG 10), and Peace, Justice and Strong Institutions (SDG 16). Some examples of these citizen science projects include TurtleSAT and MantaMatcher which generate new knowledge about a species and how to protect it. Plastikpiraten is another example that focuses on removing plastic waste from rivers. By looking at the number of times each SDG is covered by these projects, insight is gained as to which goals hold priority for Germany.

Citizen science projects display the initiative by many to combat this growing need for sustainable practices. As German citizens become more aware of the growing threat of climate change it may be expected that behaviors devoted to sustainable practices would see an increase as well; however, there is no evidence for this being the case. Instead, the responsibility is pushed to the government, increasing pressure on politicians to<sup>[30]</sup> implement more sustainability measures. This allows politicians to push for policies that may require more funding such as the Energiewende, which is German for energy turnaround and is the transition to a low-carbon and environmentally conscious energy supply.

We can see the effects of these policies in figure 2 which highlights the growth of sustainable energy sources. Despite this, changing behaviors to fit a sustainable lifestyle is still an important step in reducing carbon emissions as it is estimated that the household sector contributes to more than 60% of global greenhouse gas emissions.<sup>[17]</sup> Engaging citizens in more sustainability measures may be the push needed to produce an increase in sustainable behaviors. One channel that can be used to inform citizens on ways that they can be more involved in sustainability initiatives is through higher education. Universities are a key factor in that education through academic study, research, and programming.

## Community-University Partnerships for Sustainability

Universities play an important role in informing the general population on ways that they can be more involved in sustainable practices.

With a healthy relationship, the university and community can mutually share the benefits that each group has to offer.<sup>[16]</sup> This transaction is especially applicable in the case of sustainable development because it is the responsibility of the university to not only educate its students, but to also lead by example for the surrounding community. Specifically, in the case of raising sustainable awareness through an interactive campus tour, it is important that this method is well received and helpful feedback is given by potential future students and community members. In a broad sense, community engagement is important for the sake of the climate change fight because this involvement is inclusive and encourages as many people as possible to alter behaviors in their daily lives.

Without student body involvement on campus, community outreach would be increasingly difficult. More specifically, a study<sup>[20]</sup> explained how both the community and students can be engaged in raising environmental sustainability.

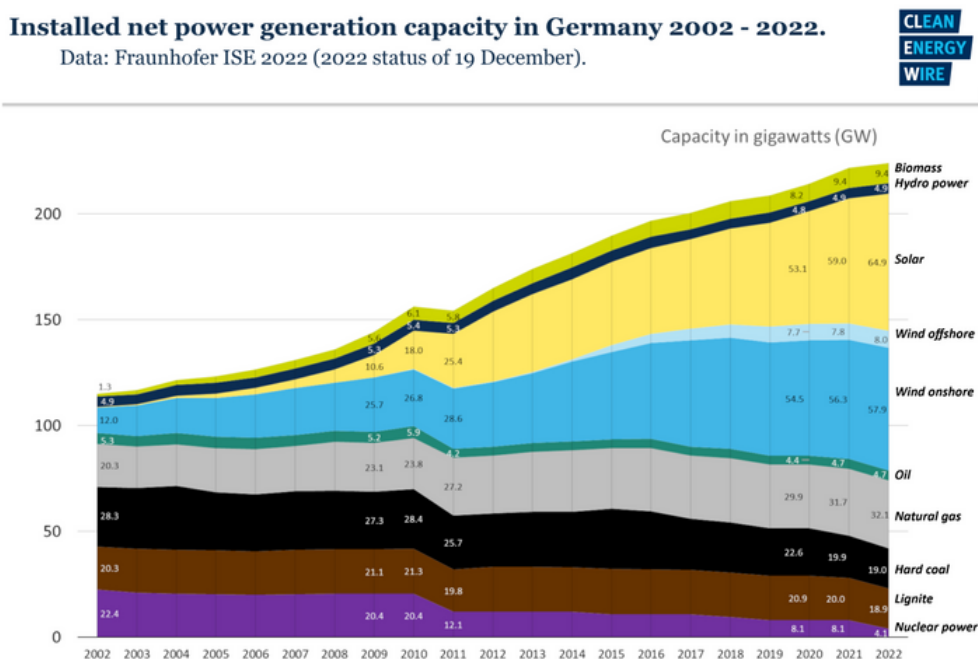


Figure 2: Installed net power generation capacity in Germany 2002-2022<sup>[2]</sup>



This was chiefly accomplished by involving the students/faculty lead projects with members of the surrounding inner city communities of San José. Rather than merely doing projects for the city these opportunities allowed students and community members to mesh ideas together and understand each other. Furthermore, this creates a bond between the city, community, and students of the university, which can be used to spread environmental sustainability goals through projects, discussion, and interactive activities.

## Sustainability Efforts Within Universities

Within universities, sustainability is being enforced from the top management downwards to ensure it is integrated effectively. Continuous training and routines that are enforced progress the institutionalization of sustainability activities in universities. This has made teaching sustainable practices in universities essential for the progression of sustainability on a larger scale. Future professionals and problem solvers from universities need these skills to ensure future sustainable development. One article highlighting implementing sustainability at universities,<sup>[24]</sup> states that the transformation towards university education for sustainable development requires three elements: Sustainable development orientation integrated into university activities, education about sustainable development, and education for sustainable development in society. This ensures that faculty and students know about sustainable development and how to incorporate it into society. The top management can use the top-down approach to strategically integrate these elements in the most efficient manner.

Over the last decade, sustainability has been more prevalent in early education and has proven its effectiveness in schools and universities. In one study<sup>[18]</sup> freshmen were surveyed to find their perceptions about the environment, their emotions towards nature, what is the

greatest environmental hazard, and how to reduce their ecological footprint. The conclusion showed that the freshman voiced sustainable opinions and supported practices such as fair trade, saving energy, and water resources. This study emphasizes the benefits of sustainability in early education as having a lasting effect on future generations and their perception of society. Every student at all levels of education is an asset as a future leader that should be nurtured. The modern world requires sustainability work in any job to ensure the building of a sustainable future.

The 17 sustainable development goals established by the UN in 2015 can be achieved globally through early education. Early education can be used to build a higher interest in the field and provide a foundation for considering sustainability in their daily lives. A review of the progress of research about sustainability education for children<sup>[27]</sup> found that with an increase in research on the effects of early sustainable education, interest in the field has grown. This in turn causes more people to become educated about sustainability and demonstrates that early education has an impact in sculpting future leaders. Figure 3 further highlights the different impacts early sustainable education can have on children. Overall this shows that including sustainability in early education allows students can become more sustainably conscious no matter the field.

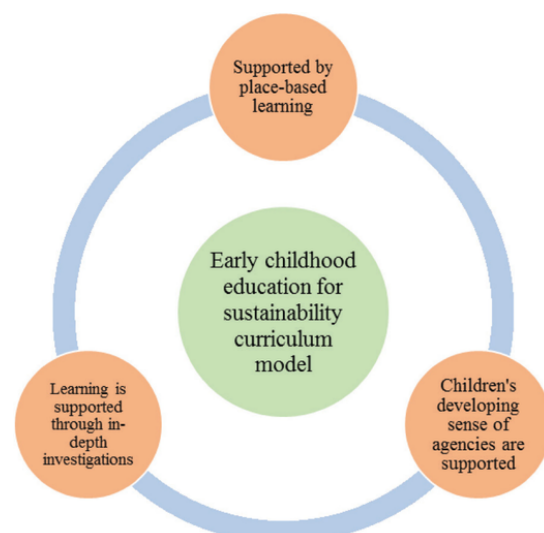


Figure 3: Model for sustainability curriculum in early childhood education<sup>[5]</sup>

## Educational Technology and General Education

The impact of sustainability education can be demonstrated on those of all ages, both children and adults, which demonstrates an effectiveness in these teaching methods. One study in particular outlines the impact of these adult focused sustainability education programs,<sup>[7]</sup> demonstrating the correlation between these programs and members becoming more sustainability conscious. For instance, in this study the researchers did a side-by-side comparison of members of this program with people not in the program on a variety of factors such as sustainability related values, sustainability empathy, and pro-sustainability actions. It was recorded that those participating in the program scored significantly higher than those who didn't participate in a program. This shows that there is direct evidence for the improvement of sustainability practices in those who are educated on the topic.



## Gamification of Sustainability

When well-designed, learners can better grasp and retain content when engaging in interactive, gamified learning experiences. Gamification, also known as gamified learning, is considered a different topic than game-based learning. The latter is based on the design of fully implemented games, while gamification is modifying the learning experience itself to include more game elements in the process. Some examples of these features can be seen listed in figure 5. An in-depth analysis of this concept explored the effect of gamified learning on various methods of education such as cognitive, motivational, and behavioral.<sup>[23]</sup>

This study proved that gamified learning shows a direct increase in content absorbed by the learner in all three methods of learning when applied with varying factors taken into account. An additional study showed evidence that some instances of gamification have created a learning environment with more instances of friendly competition as a means of motivation.<sup>[32]</sup> This study also outlines and focuses on three positive outcomes from a model of gamified learning: an increase in students' engagement and motivation, academic achievement, and social connectivity.

There is additionally the benefit of this gamification model of learning that promotes problem solving and critical thinking skills in the player as opposed to more traditional methods of regurgitating information.<sup>[11]</sup> One particular past IQP project done by students at Worcester Polytechnic Institute put this idea into place by creating a computer game with the intent of teaching Worcester residents about sustainability.<sup>[29]</sup> They additionally curated a wiki called the Knowledge HUB that contains resources and guides for participants to learn more about sustainability in a condensed and easier-to-navigate format. Though there are countless studies proving the effectiveness of

gamification and gamified learning, these specific real world examples such as the IQP example can demonstrate a more practical use than simply those designed for use in an academic environment such as a classroom.

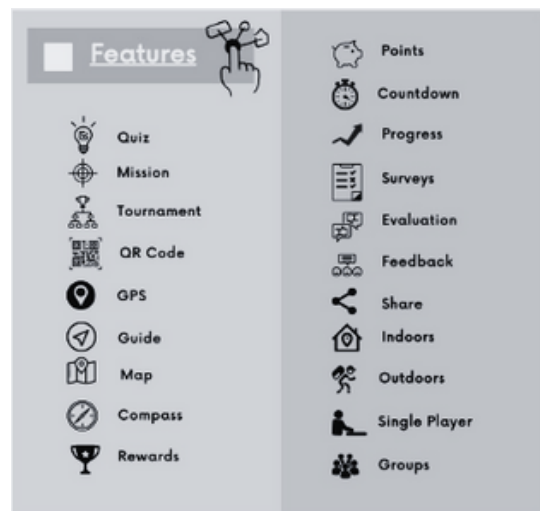


Figure 5: Actionbound Features<sup>[1]</sup>

## Conclusion

The purpose of this literature review is to help the readers of this proposal understand the different areas of sustainability and ways to educate others in this field. These categories outlined above can help break this big overall task into smaller pieces and areas of study throughout the research. This is significant because many people do not realize how important sustainability is in daily life and the direct impacts it can have on global citizens. If there is a better means of informing members of society on these nuances then it will encourage more people to follow these practices. In doing so, the example set by these individuals will then aid in spreading the awareness through demonstration. These topics are explored in the practice and implementation of the project through the interactive campus sustainability tour via the Actionbound app.

# Methods

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## Research Questions:

The project team has formulated three research questions to help guide research and set up which areas of the project on which they focused. These three questions outlined below were answered through the team's research methods and approach as explained later in the methodology.

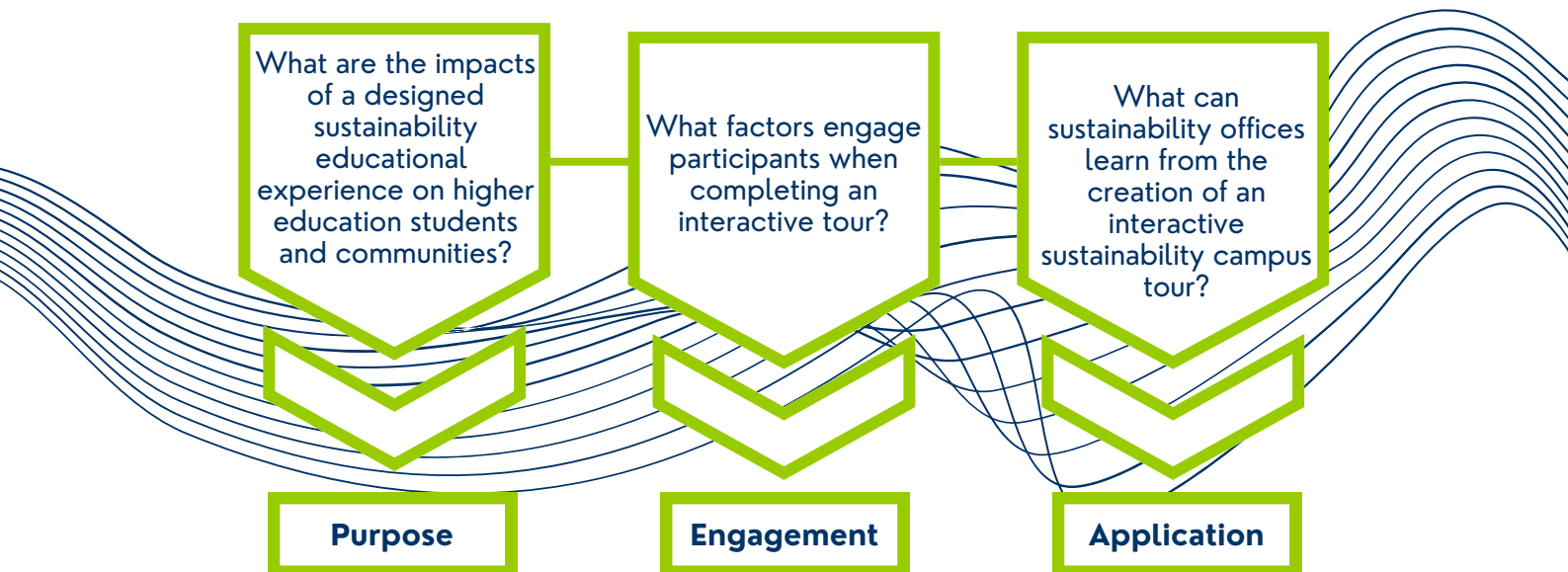


Figure 6: Research Questions

## Objectives:

By the end of this project, we intend to...

1. Discover what interactive features and the execution of them attract the most students to gamified education through the research and analysis of existing Actionbound tours.
2. Evaluate the degree of how involved students are in the campus sustainability initiatives.
3. Incorporate easily replicable and usable design features, as well as document our process and findings in order to facilitate the creation of future interactive sustainability experiences.
4. Create a tested Actionbound "bound" that serves the goals of interactive sustainability education and outreach by informing the public about the university's existing sustainability efforts.
5. Collect data from focus groups on what students want to see in this interactive experience.

The team utilized the three methods as seen in figure 7 to complete the objectives associated with the research questions.

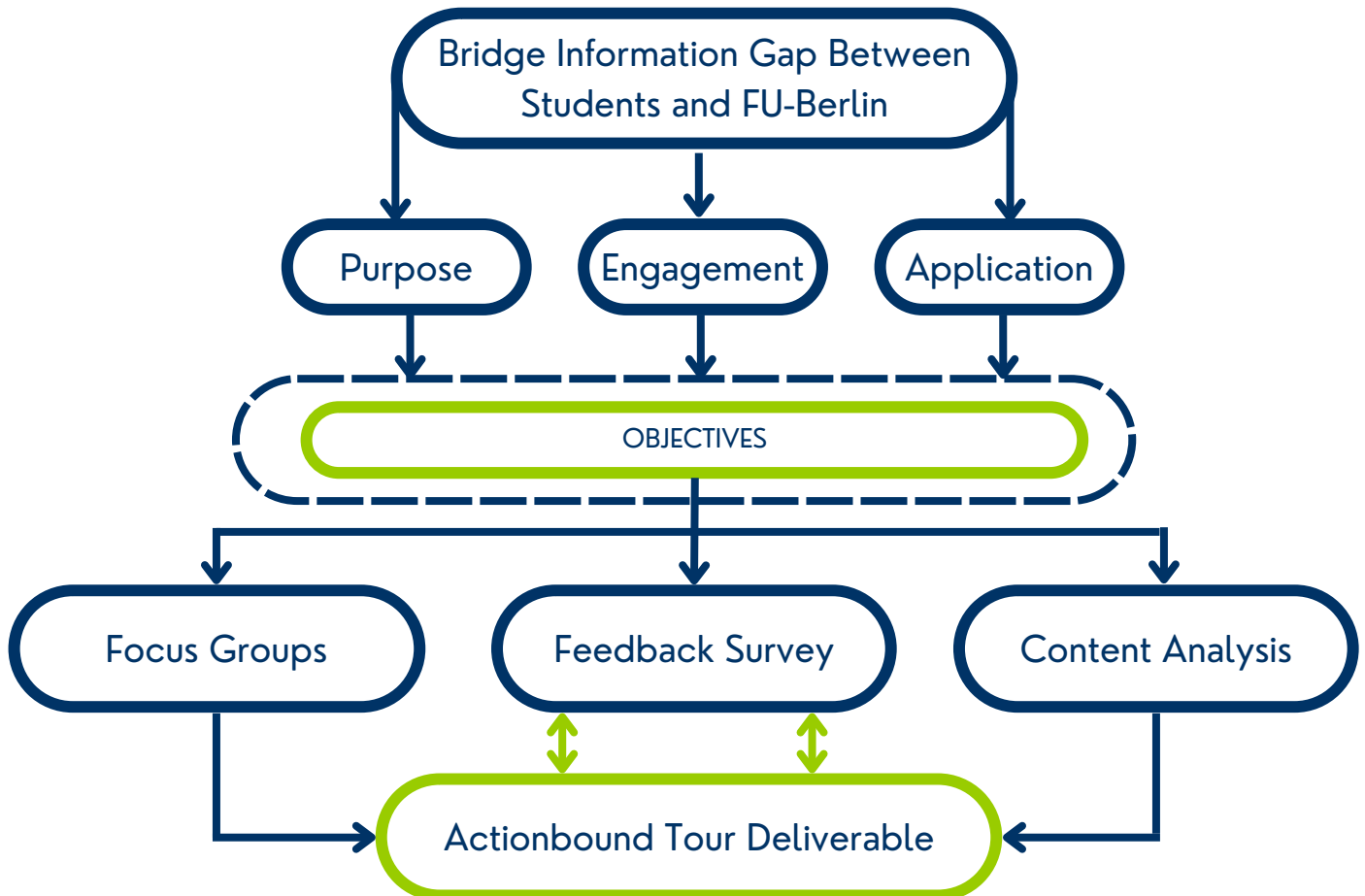


Figure 7: Methodology Breakdown

## Research Design Approach

When selecting a research design approach there are several areas one must consider. These approaches can chiefly be categorized under qualitative and quantitative, but can also be done concurrently, which is referred to as mixed methods research. The employment of these three methods allowed the team to collect and analyze both the quantitative and qualitative data, which provided a well rounded report. In this report, the team explored areas in all three of the research methods: qualitative, quantitative, and mixed methods, as outlined below.

The research approach for the study included qualitative, quantitative, and mixed methods. The quantitative data was collected to not only determine the number of people who used the tour, but more specifically what sections of the bound they completed and how long they spent on it. This data revealed what stops were worth including on the tour and if it was attention grabbing. On the other hand, the qualitative approach sought out to reveal more about the user's personal experience. This qualitative data was collected through student feedback, both at the beginning and end of the project, by conducting two focus groups and placing a detailed feedback survey at the end of the tour.



This provided relevant advice about the current tour, if they enjoyed the new Actionbound tour, and what they learned something from it. Through collection of this data in tandem, the team ultimately used a mixed methods approach that not only provided insight into what students think, but also compared the sustainable development goals of Germany and FU-Berlin's commitment to educate its students.

## Focus Groups

The project team hosted regular focus group workshops with students of FU-Berlin to collect feedback on the importance of sustainability and the overall efforts of FU Berlin, along with the impact of student initiatives and student voices. To prepare for these sessions, the team utilized the process seen in figure 8. In these workshops, questions were posed to learn what is engaging and what should be highlighted in the tour. The project team asked students and faculty if they think the tour provides an accurate representation of the sustainability on campus, what their opinions on sustainability are, and what sustainability projects they think would be beneficial to highlight in our tour. The team also hosted another round of focus groups with students who are not as involved with the sustainability programs on campus. These students, under a different round of questions, were able to offer insight from those who are mainly unaware of FU-Berlin's current initiatives and how they could be better connected in the future.



Figure 8: Process of Focus Groups

## Data Collection Plan

To collect responses and data during the focus groups the project team relied on note taking and audio recordings of the session. This allowed the team to take detailed notes/transcripts of the focus groups, which were enough on their own, but in the case something was missed or could not be translated, the audio recording could have served as a backup. Specifically, during the focus group sessions the team asked a series of questions that mainly fell into "yes" or "no" responses or were on the Likert Scale. This allowed the team to have quantifiable data that can be presented in the final report, but also opened the discussion to narrative feedback from the students afterwards.

Once the first version of the tour was playable on Actionbound, the team encouraged students on campus to use it. After their completion of the tour, the user was presented with post tour feedback questions via the survey feature on the Actionbound app and also a few questions from the team in-person when possible. The post-tour feedback questions offered insight on what needed to be directly changed on the new Actionbound tour, rather than more of the interests and perspectives recorded during the focus group sessions.

## Analysis of Existing Material and Focus Group Results

The second area of focus throughout the project was content analysis, this included an analysis of related Actionbound campus tours, the existing FU-Berlin tour and the information gained from focus groups, playtesting, and feedback surveys. Specifically, the team members all participated in the sustainability Actionbound, provided by the University of Hamburg. An example from FU-Berlin's existing tour is shown in the screenshot in figure 9.

While the team was limited in the inability to use the GPS features of this tour, it offered great insight into what interactive features were used to effectively market the university's sustainable initiatives and goals. By looking at the past sustainability tour of FU-Berlin, the team decided what features were of benefit to the existing tour and what could be translated to the new FU-Berlin tour on Actionbound. Additionally, the focus groups as outlined above enlightened the team on what features from the existing tour that students found helpful, what they wanted to see added, and what they wanted to see removed or altered. From this, the team identified frequent responses or common patterns that guided the design. This analysis provided the team with enough insight to create an engaging, effective, and accessible Actionbound tour for its users. After the first deliverable, the post tour feedback survey, outlined in the next objective, supplied the team with the final edits for the tour.

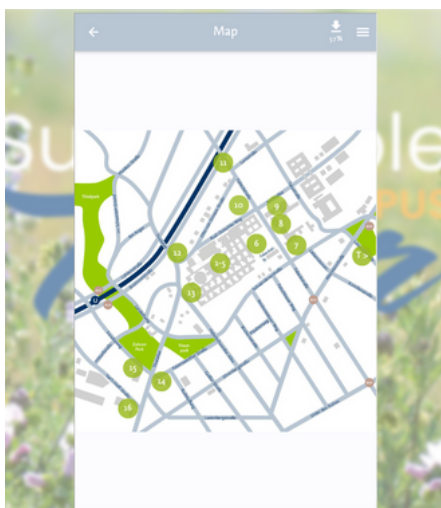


Figure 9: Existing Sustainable Campus Tour<sup>[26]</sup>

## Actionbound Development

At the early stages in the project, the team members explored the Actionbound platform and all the features offered. The project team learned that for designing the bound itself, coding languages called markdown and html are used, this tool allows for more control of how the text and images are displayed on the users' devices. Two team members took time in the beginning of development to learn this language and recorded their findings to aid in future development on the bounds. Additionally, more research and testing was done for each of the different types of experiences that could be potentially added to our bound: location, quizzes, information, and QR code options. For example the project group went to the campus to test the GPS functionality of the app. The group discovered that being in and near buildings interferes with the GPS signal. If using GPS wasn't possible the team would have resorted to using QR codes instead. Testing of the app early in the design process allows focus on the features that are actually available and functional for the needs of the Interactive Sustainable Campus Tour.

The team has developed a workflow for working within the Actionbound platform, as only one team member can be logged into the actual website at once. As a result the team divided tasks into various subtasks and used a collaborative document with the markdown and text for each location, so everyone is able to contribute. This method also ensured that ideas were not forgotten and were implemented into the app in a timely manner.

Additionally, the project sponsor arranged a meeting with a representative from Actionbound to allow the team to ask questions and collect feedback on the current iteration of the tour they have created. This was an opportunity to ask questions and potentially recommend new features for the website to eventually develop. The project team recorded notes from this conversation and made changes as recommended by the professional from Actionbound.

During research, the project team explored several Actionbound tours that focus on sustainability. From there, they looked for the best qualities and features which promote interest and engagement, such as multiple choice questions, short answers, picture and audio submissions, and slider estimation. These relevant features that we found in the research were then implemented into the interactive sustainability tour created by the project group.

## Post-Tour Feedback

The data collection method the project used at the end of the experience is a feedback form placed strategically to promote more completions by tour participants. A survey was put at the end of the tour to gauge participants opinions on it, if it was engaging, provided accurate information, what could be improved, etc. An example of one of the questions asked can be seen in figure 10. This could also allow the project group to understand if students were retaining any information from the tour and allowed the team made the appropriate adjustments.

Additionally the project group employed field observation throughout the entirety of the playtesting time, closely monitoring those engaging in the interactive sustainability tour and recording how they respond to it. Observing how people interact with the app and if they actually play the games/interactive aspect of the tour directly demonstrated which aspects were working and which aspects should be workshopped. This allowed the project team to know if users were finishing the tour and if they were not, then where they are stopping was documented. Participant behavior in the form of interaction and engagement is important to monitor because they are the things the project team is trying to inform with their experience.

**SURVEY**

### End of Tour Feedback Survey

Did you enjoy the tour?

- Very dissatisfied
- Dissatisfied
- Neither dissatisfied or satisfied
- Satisfied
- Very satisfied

**Vote**

Figure 10: Example Survey Question from Actionbound

## Connecting with Directors of Sustainability in the United States

The project team arranged meetings with a director of sustainability at one university in the United States with the intent to gain insight on their respective sustainability programs compared to that of FU-Berlin and Germany as a whole. This allowed team members to ask about the importance of sustainability goals and culture on campus, which was then compared to findings from speaking to the sponsor from the Sustainability office at FU-Berlin.

Through this interview with Paul Mathisen, the sustainability director at Worcester Polytechnic Institute (WPI), the team found that, similarly to FU-Berlin, the biggest issues that WPI and other institutions face is student engagement. He also believes that the school could greatly benefit from an interactive tour or scavenger hunt. Overall, this shows that what the team learned is applicable to other universities and the tour we developed could be used as model for other universities, with some alterations to make it more relatable for the target audience or university. In the future, further discussion with leaders in sustainability at other universities would offer more insight to create a model that is more inclusive of different audiences.

## Challenges

When performing data collection such as this, it can be anticipated that there will be some challenges or limitations. One of the main challenges was getting enough responses from the end of tour feedback survey. This is a concern because it can be difficult to entice users to take time out of their day to respond to a survey.

Considering this, the team was mindful when creating questions to make sure that they are relevant and easy to answer. In addition, the academic calendar of FU-Berlin presents a challenge when coordination of the focus groups began. Fortunately, the sponsors were working with the team during this time to assemble groups of students, as well as their meeting times. Another concern is how to measure the tour's engagement and effectiveness. While this challenge can be addressed by the feedback survey at the end of the tour, this can also be handled through relevant quiz questions throughout the tour. These questions allow the user to prove that they are not only going through the tour, but are hopefully retaining the information within it.

# Results and Outcomes

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## Focus Group Findings

The utilization of a focus group allowed the team to gain insight on student involvement and interests. The data collected provided the necessary insight for a relevant tour to be developed on Actionbound. From the first focus group the team generally found from responses that all participants feel as if their voices are heard on campus, but that FU-Berlin has been lacking in their efforts since the Covid-19 Pandemic. Participants stated that due to courses being moved online and less on-campus involvement, that a disconnect has been formed between FU-Berlin and its students. On the other hand, several of the participants stressed the many initiatives on campus and their successes. The Actionbound tour was developed and used to reconnect FU-Berlin's student body to these sustainable initiatives. Overall, there was a trend towards utilizing incentives and prizes to get students to download the app and complete the tour, along with a push for taking advantage of the in-person student orientation in the fall and social media accounts for FU-Berlin. The group found that use of FU-Berlin's social media accounts and suggested delivery time frame of the tour were feasible and especially useful on and near events being held on campus to generate more interest. However, the team was informed by the sponsor coordinator that the distribution of incentives would most likely not receive administrative approval because of the cost involved.

## Interview with FU-Berlin Student

The project team hosted a one-on-one interview later in the project with a law student who is less involved in the sustainability initiatives of the University than those in the first focus group. Holding this focus group allowed for a change in perspective compared to the first group, as this student is not currently involved with any sustainable initiatives on campus, but used to be more so. The participant in this interview felt as if his voice is not heard on campus because most of the decisions are made by the administration with little input from students. The student parliament has a low voting percentage from the general student body and the individual committees (such as the sustainability focused one) also have lower engagement and involvement.



Figure 11: Picture of FU Berlin Campus <sup>[28]</sup>



## Actionbound Iterations

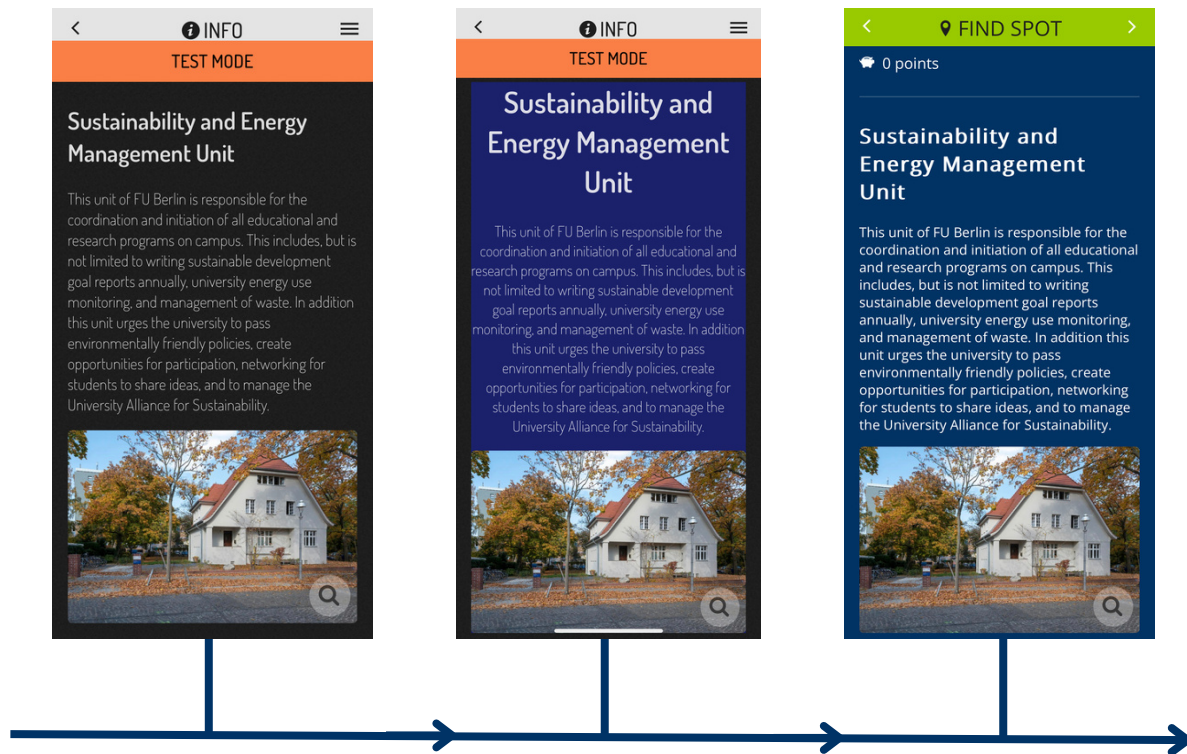


Figure 12: Actionbound Tour Iterations

Using the information gained in the focus group and interview, the project team finalized the tour stops, Actionbound development began. These initial steps included the addition of a GPS location for each of the ten stops, which had a working title, description, and image. From this the team created interactive features for each of the stops, which included a quiz question based on the material discussed at the stop, with the addition of another interactive feature. This included open responses for users to have the opportunity to voice their opinions on the sustainable initiatives and picture/audio uploads to encourage participation in the tasks at each stop.

At this point the team submitted the material included on the first version of the tour to their sponsors for review. In the meantime the team began to format the tour in the corporate color scheme, as seen in the second iteration above. To do so, markdown and html were used to format the text and add a colored background on the page. Later on, the team gained access to the style feature and were able to fully incorporate the corporate color scheme and logo of FU-Berlin. Following this, the team made edits according to the sponsor's feedback and made other updates, which resulted in the third and final iteration used for playtesting, as seen above in figure 12.

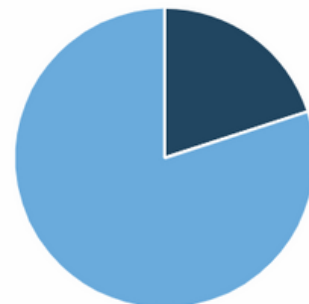
## General Playtesting Feedback

Upon completion of the first Actionbound deliverable, the team collected feedback on this primary iteration. This feedback collection was done by including a detailed feedback survey at the end of the tour and looking at the analytics of the tour as provided on the Actionbound website. Through this feature, the team was able to see specifically which stops and missions were being completed, as well as the time spent on the tour and specific responses. To garner a substantial amount of feedback, the team utilized the student contacts gained from the first focus group, members of the sustainability office at FU-Berlin, and members of the Berlin IQP cohort. The next steps for the team were to keep watching the results and feedback as it came in and updating the current version to address any concerns.

Once playtesting began and feedback was received, the project team found out how accurately the users answered the questions and the time spent on the tour. Specifically, the results showed that each user completed all of the multiple choice questions, but that only half of them uploaded a picture for the bike charging station. The lack of participation on this specific bound is most likely due to the fact that several of the play testers were not students of FU-Berlin and might not have been willing to go into an unfamiliar environment and put their belongings in a locker in order to gain access to the bike. The results interface also revealed that the average playtime of the tour was around 3 hours and 5 minutes. However, this average is inaccurate for two reasons mentioned by playtesters: some users opened the tour too far in advance or forgot to click the finish button at the end of the tour which added much more time.

Through the use of the feedback survey placed in the outro of the tour, the project team also gained useful insight into categories such as who was taking the tour, how usable it was, and how satisfied they were. From these multiple choice questions, the team saw that half the play testers were faculty and the other half were either students or visitors. The survey also revealed that all playtesters thought that the tour was easy to navigate and that they would also recommend the tour to others. Furthermore, three-fourths of playtesters were satisfied, while one-fourth were neutral when asked if they were very dissatisfied, dissatisfied, neither dissatisfied or satisfied, satisfied, or very satisfied, which can be seen in figure 13. Lastly, the post-tour feedback offered the opportunity for open-ended suggestions, which highlighted that the tour helped users learn about the sustainability initiatives on campus, but also revealed that some features such as GPS could be placed more accurately. Overall, both the statistics from the tour and the individual feedback survey questions provided the project team with substantial feedback on what interactive features were well received, in order for them to make final edits and recommendations for future iterations.

Survey: End of Tour Feedback Survey Did you enjoy the tour?



Key

- 1 Neither dissatisfied or satisfied
- 4 Satisfied

Figure 13: Sample Survey Response

## Interactive Features Utilized

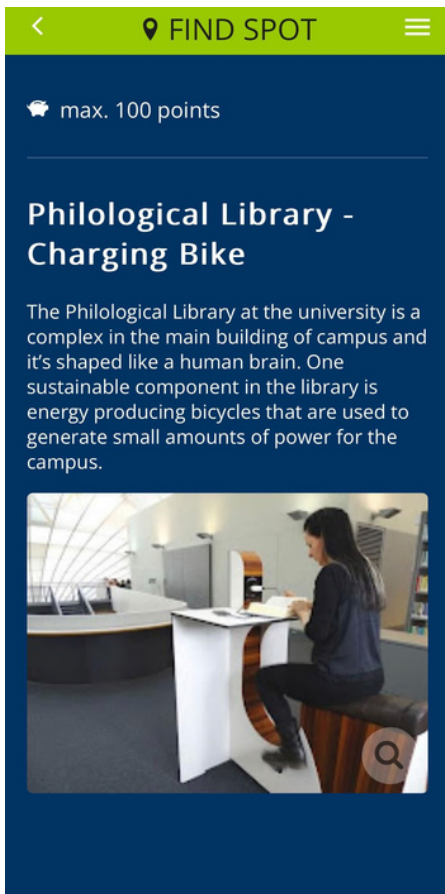


Figure 14: Information on the Find spot bound from tour

Each informational section for the tour stops includes a header, picture, and text description that will provide the answer to whatever activity or question format follows. This is shown above in figure 14.

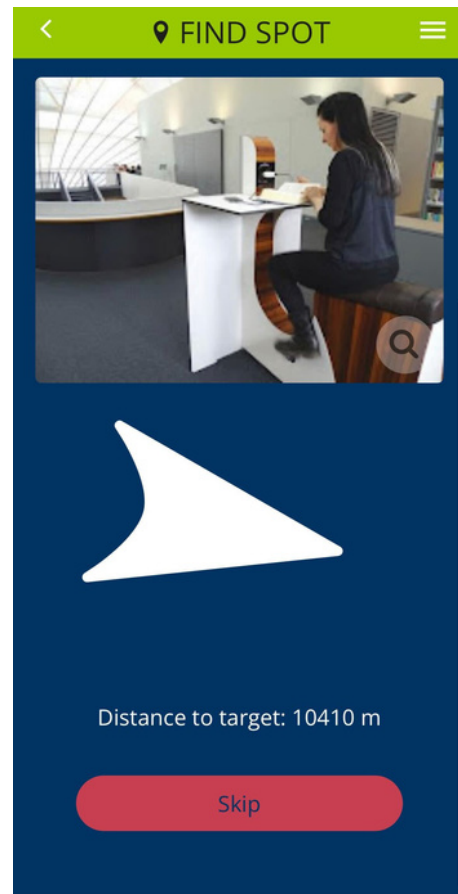
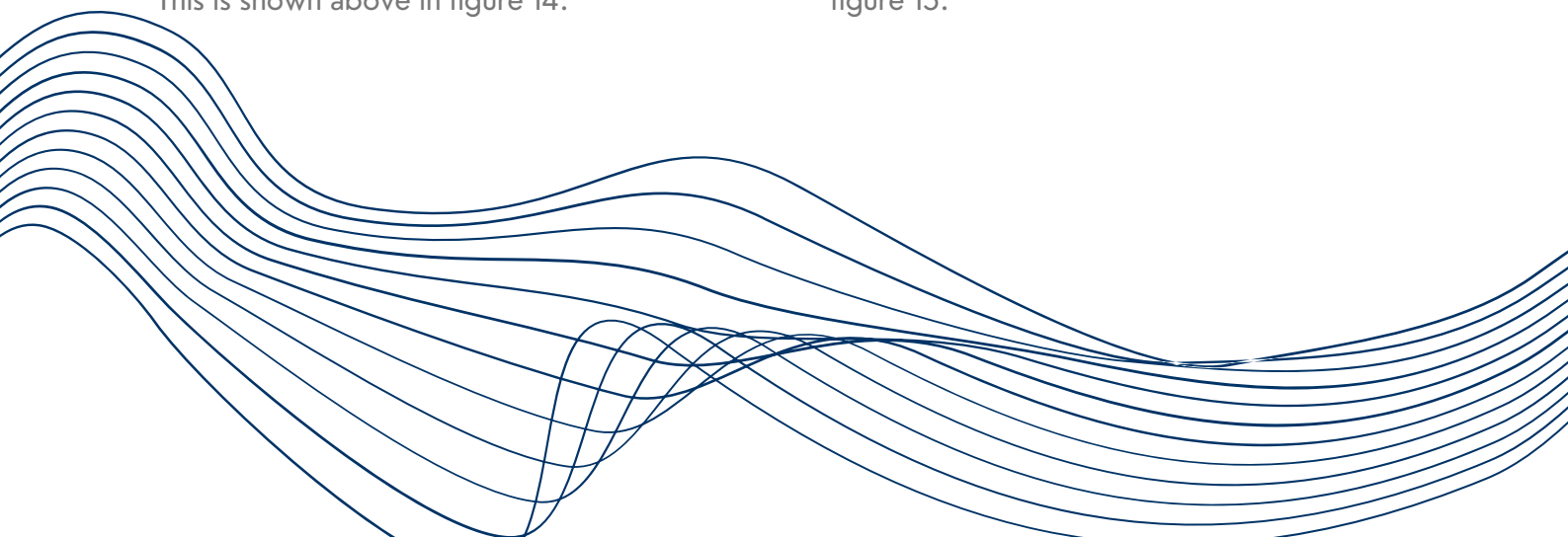


Figure 15: Directional arrow on Find spot bound from tour

The GPS feature uses real time location tracking to provide the user with an arrow that will lead them directly to each interactive stop. This is shown above in figure 15.



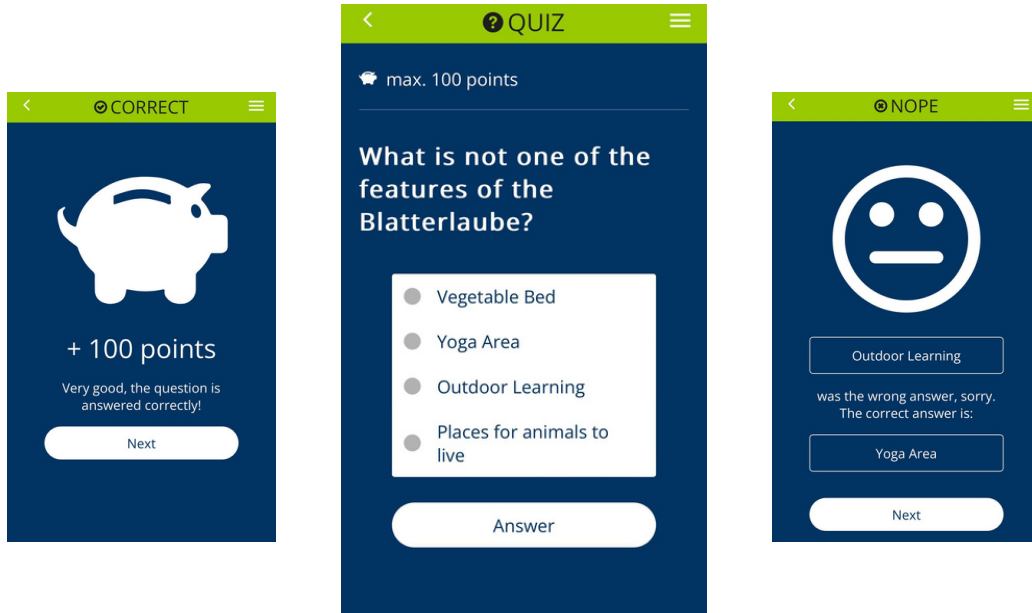


Figure 16: Multiple choice feature with correct vs incorrect answer choice

The Find Spot bound is followed up by a Quiz bound or a Mission bound. The Quiz bound has a multiple choice question that rewards points for the correct answer and provides the correct answer if answered incorrectly as shown in figure 16.

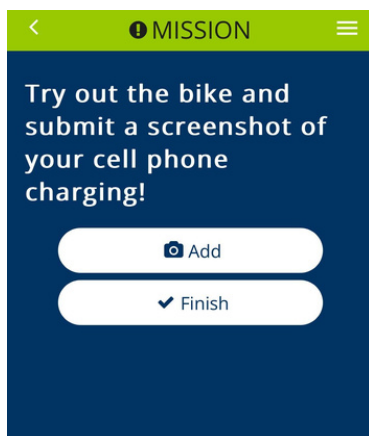


Figure 17: Mission feature for uploading a picture

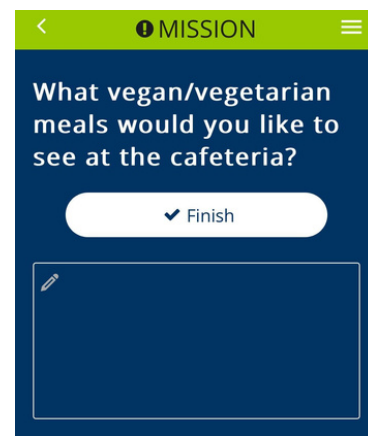


Figure 18: Mission feature for open-ended response

The Mission bound either asks for a picture upload or an open-ended response. These bounds also reward point upon completion. The points are calculated the end, the user can compare their previous scores to see if they have a better grasp on the different aspects of sustainability around campus. The two types of mission bounds are shown in figure 17 and 18 respectively.



# Recomendations

The project team has taken into account the fact that we are unable to realistically complete all aspects of this project, as it has grown immensely in scope over the course of our time working on it. With that consideration, the group has come up with a guide for those who may be working on the project after us, such as university staff in the office of sustainability or even future project groups. The advice and overall guidance outlined in this mini-booklet goes over everything from creating a stop in Actionbound, to configuring the settings and implementing the style feature. The purpose is to make it clear what has been done and what can be done in the future. There were also other stages that are needed for further implementation of the interactive sustainable campus tour besides just the deliverable such as marketing the tour and creating ways to get it out into the student body.

The project team will not be there to directly deliver the tour to students and promote it on the campus, so there are some additional recommendations for what the best way to achieve higher participation would be. The first suggestion is to implement the tour in some kind of student orientation or other campus programs that already exist, therefore those advertising it will not have to come up with something from scratch. One example of this would be during a lecture, like the one seen in figure 19. Another potential option is to advertise on a social media platform using the university's already existing accounts. An example would be posting on the FU-Berlin's instagram account and creating either a post or story encouraging those on campus to take the tour and potentially get some kind of incentive for doing so.



Figure 19: FU-Berlin Students <sup>[28]</sup>



There was initially an idea from the project team of creating some sort of physical incentive for completing the tour, but there was a limitation in the fact that the sustainability office is unable to provide consistent funding for that sort of thing. A potential solution that could be implemented after our time here would be a final stop at the sustainability office that provides a prize for completing all the stops and not skipping any. If implemented, the sustainability office stop, shown in figure 20 would be fixed to the end of the tour and there could be a locker with small prizes. This locker would be able to be opened using a code or puzzle that you would have by completing everything in the tour. This would have to come much later after our initial development of the project, so this information is for the office to take into account if they decide to offer incentives of some kind.



Figure 20: FU-Berlin Sustainability Office <sup>[28]</sup>

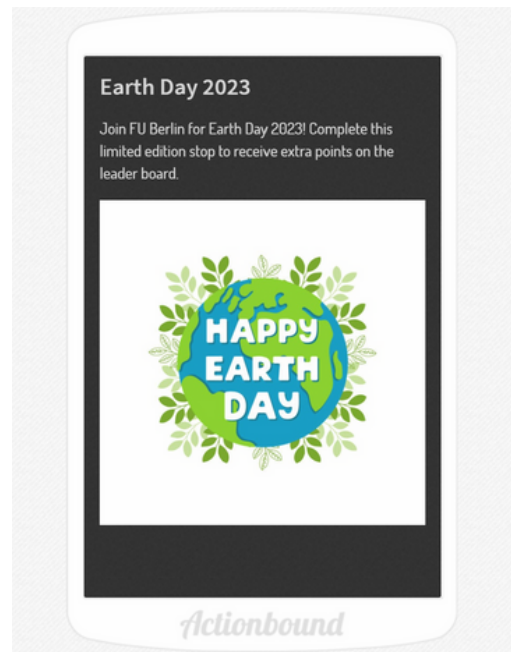


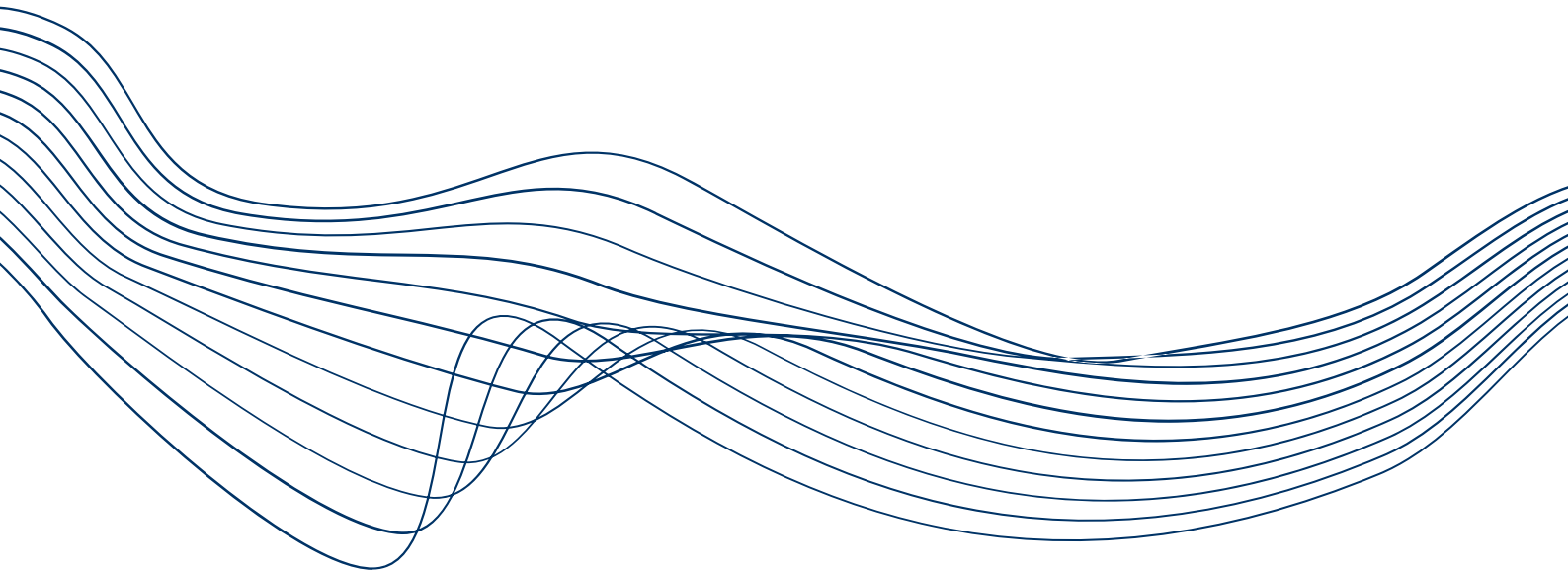
Figure 21: Stop for Earth Day which is only active on April 22nd

The final recommendation the project team had was to implement some timed events and locations that are activated using switches in the Actionbound platform. This means those developing the app in the future could potentially add special quizzes and other interactive activities that only appear and are able to be completed on days such as Earth Day and other sustainability focused events and holidays. Figure 21 shows an example of a stop for Earth Day. The project team believes that if the tour has some stops that change over time it will add to the replayability factor of the experience because of the additional content and information.

# Conclusion

The interactive tour on Actionbound serves as an effective link to bridge the gap between the students' knowledge and the sustainable development goals of FU-Berlin. The tour engages students through the use of games and quizzes that utilize GPS technologies and areas of interest on the campus. Research of FU-Berlin's and Germany's SDGs provided the necessary background and starting point for the team upon arrival in Berlin. Review of the existing tours, coupled with focus groups and feedback surveys with students allowed the team to design a tour that reflects the interests of the students and is also inclusive. This will increase the potential outreach of the tour and strengthen the connection between the students and FU-Berlin's SDGs.

While there are some concerns with respect to response rate on the feedback surveys, this can be supplemented with the detailed response found through focus groups. In doing so, the team was able to provide a project that met the expectations of the advisors, team, and sponsors.



# Appendices

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## Appendix A:

### Focus Group Questions:

- What sustainable development programs are you familiar with on campus?
- Are you involved in any sustainability efforts on campus?
  - If so, what are they?
- Do you think your university has established sufficient sustainable goals?
  - Have they followed through?
- Are you involved in any student groups/clubs on campus?
  - If so, does that group have a sustainability mission?
- If there was one behavior or action that you or others could take to be more environmentally conscious, what would it be?
- Do you feel you have a say in the university's sustainability initiatives? (Agree/disagree)
- What would drive you to want to take the tour?

## Appendix B:

### Feedback Form:

- Did you enjoy the tour? (5 point likert scale)
- Did you learn anything?
  - If so, what?
- Would you recommend this tour to others? (Y/N)
- Was the tour easy to navigate/use? (5 point likert scale)
  - What gave you difficulties if any?
- Are you a student/faculty or a visitor?
- Is there anything missing/should be added to this tour?

## Appendix C:

### Questions for Sustainability Directors:

- Can you tell us a quick overview of what the sustainability program does and what goals it has?
- What are some student initiatives and other student involvement opportunities in regards to the Sustainability Office?
- How does the sustainability program at WPI rank amongst similarly sized universities?
- Do you think WPI could benefit from an interactive campus tour?
- What do you think could be improved upon the most?
- Do you have any other advice or tips for the project team?



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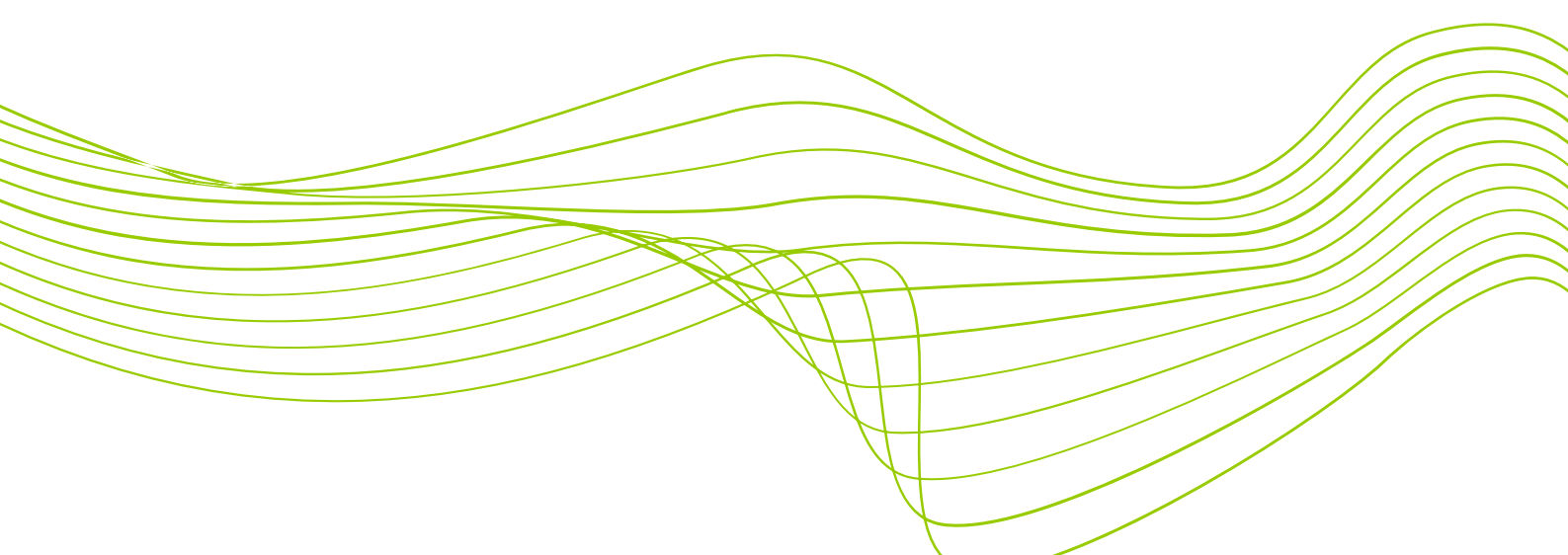
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## Focus Group

Felix Hoffmann  
Karoline Langner  
Leon Salisch  
Moritz Zöllner

## Actionbound Mentor

Moritz Behrmann-Fink



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