IMPROVEMENT PLAN: RECOMMENDATIONS FOR THE ASEE HUB

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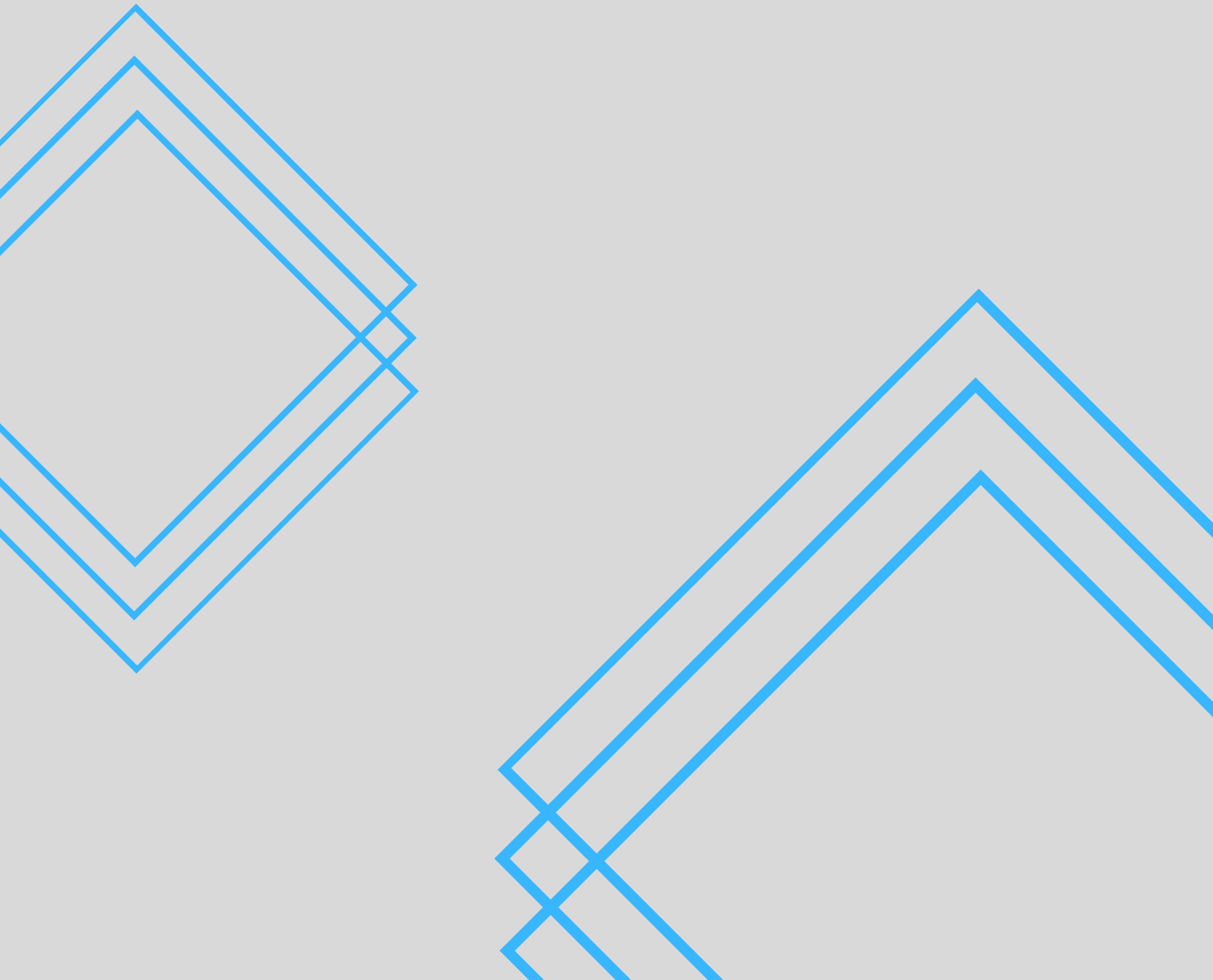

Abstract

The purpose of this project was to investigate the ASEE Hub. This project delivered an analysis and improvement plan for the ASEE Hub to the ASEE. The team utilized UX design and market research to suggest improvements to the platform. The improvement plan aimed to suggest improvements to the Hub based on the needs of ASEE and its members.

Executive Summary

Introduction

The American Society for Engineering Education is a non-profit member organization that aims to connect engineering educators across the nation. In April of 2020, the organization launched the ASEE Hub. The Hub is an online platform meant to encourage collaboration and communication between members.

The purpose of this project was to assess the ASEE Hub and provide a set of recommendations for improvement.

Background

Our research focused on two main areas: User Experience and Marketing. User Experience, or UX, is how a user interacts with a product or service. UX focuses on improving several core areas that influence how a user interacts with a website. This encourages user engagement and retention on the platform.
Marketing is the practice of promoting a website to the target users. An effective method of marketing is product advertisement through social media and emails. This delivers the information to potential users in a fast and efficient manner. Marketers utilize consumer behavior analysis to personalize content towards users. This encourages positive user interactions with the product, gaining new users and retaining existing ones.

Methodology

The team utilized four primary methods of data collection. First, the team interviewed both ASEE members and ASEE staff involved in the creation or upkeep of the ASEE Hub. Second, the team conducted a usability study on the Hub to determine how new users interact with the site and locate any UX issues. Third, the team collected user analytics data to understand user activity. These analytics were accessed through the Hub's vendor, Personify. Fourth, the team surveyed ASEE members to gain an understanding of the members' needs from both the Hub and ASEE.

Findings

Using interviews with ASEE members and staff, user analytics, and a usability test, the team uncovered important information to accurately assess the Hub. First, the team needed to understand the member base and how they interact with the ASEE. From a 2017 Membership survey, nearly three-quarters of ASEE members are professional members within the US. Furthermore, from the survey the team conducted, a vast majority were professional members, and 60% were members for over 10 years. Using our survey, the most valued benefits by members were the Prism Magazine/Journal of Engineering alongside Member Networking opportunities.

Second, the team needed to assess the current state and usage of the Hub. User analytics data indicated that the number of new members per quarter stays roughly constant. However, as of December 1st, 2021, the number of active users per quarter has been in a slight decline. The team also collected forum topic creations and replies metrics to measure the interactions between members. Throughout Q3 of 2021, there were 21 topics created with only 2 total replies to those topics. Furthermore, the team sent out a survey to approximately 12,000 ASEE members. However, the team only received 41 responses from the membership. From the survey, ~76% of respondents reported that they had heard of the ASEE Hub. Among those who had heard of the Hub, over 68% of them rarely/never use the Hub. For users that had never heard of or used the Hub, the survey then briefly explained the Hub's features and asked for their feedback. 80% of these respondents rated that they are somewhat to extremely unlikely to use the Hub.

Finally, to understand how the Hub performs in a real-world scenario, the team conducted a Usability Test. Participants were given access to the Hub to perform three general tasks. These included sending a message to a Hub member, locating a publications discussion board, and joining a specified ASEE group. Afterward, they were given a System Usability Scale questionnaire to rate their experiences. Many users found that the features of the site were not well integrated and confusing. Furthermore, several users became lost, stuck, or encountered a technical issue on the site. Once all the Usability Tests finished, the scores were compiled and processed into a 100-point scale. On average, participants rated the site as 47.125/100, with a low of 10 points, and a high of 87.5.

Discussion

Analysis

First, our team was able to gain an understanding of the ASEE Hub. ASEE aimed to replace their conventional listservs with the Hub to allow two-way communication between members and the organization. Additionally, the Hub was intended to be a more centralized site for communication and collaboration, particularly within ASEE divisions.

Second, the team found that the Hub has issues with usability and accessibility. The site can be difficult to use, particularly for first-time users, and also suffers from several technical issues. These issues contribute to a less pleasant user experience and drive new users away.

Third, from surveys and interviews, the team found that ASEE members either do not see the benefits of using the Hub or are not aware of its existence. This indicates that a more targeted marketing effort is needed from the organization to draw in new users.

Fourth, the team found that the ASEE Hub is underutilized by the organization. The Hub is not maintained with new and interesting content for the users. This is seen as news about ASEE conferences being either out of date or not published. Furthermore, research into similar sites indicated that a successful online platform requires a dedicated community manager to encourage engagement and draw in new users.

Recommendations

Based on these findings the team made several recommendations. Listed below are two points the team found most crucial.

- ASEE would benefit from a continued effort to inform ASEE members about the Hub and its benefits. This should particularly target division leaders who would be critical in transitioning the members to the Hub.
- ASEE would benefit from taking a more active role in the Hub on a daily basis. This includes a community manager for the Hubs discussion pages, updating the news on the Hub, and releasing information about conferences and publications on the Hub.

The team strongly believes that these are necessary steps to draw in new users while retaining existing ones.

Limitations

Due to various constraints, the team's research was limited in scope. Due to the small sample size in both interviews and surveys, these findings may not be representative of the whole ASEE community. Thus, more in-depth studies and surveys would yield more definitive results.

Conclusion

The purpose of our project was to analyze the ASEE Hub and provide recommendations for improvement. The team collected necessary data through surveys, interviews, a user analytics tool, and a usability test. The team recommends that ASEE would benefit from a targeted marketing effort to the ASEE membership as well as taking a more active and supportive role in maintaining the Hub.

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Introduction

Many individuals seek to join professional organizations for several reasons. Such organizations offer the ability for members to improve their knowledge, expand their network, and form a community of like-minded individuals. The American Society for Engineering Education, ASEE, offers these benefits to individuals in the field of engineering education.

ASEE aims to advance innovation, equality, and access to engineering education. It was originally founded in 1893 to push for engineering education reform. In 1946 the organization shifted its focus to connecting educators across the United States as well as promoting inclusivity and improving teaching strategies in the engineering field. ASEE retains a wide network of its members through annual conferences, journals, and a newly added online community website, the ASEE Hub.

The ASEE Hub is an online platform built for its members to communicate and collaborate. ASEE felt that the Hub would benefit from research into the members' needs and how to create a robust online community.

The purpose of this project was to provide a set of recommendations to improve the ASEE Hub. To conduct a thorough investigation of ASEE, the ASEE Hub, and its members, the team had three objectives: understand the members' needs, assess the current state of the Hub, and evaluate the best practices for launch and potential development of an online community.

Background

American Society for Engineering Education

The American Society for Engineering Education, or ASEE, is a non-profit and non-governmental organization that promotes engineering education through a variety of methods. These include large educational conferences, academic programs, and political activism. ASEE's annual conferences enrich engineering education by forging connections and promoting collaboration. These conferences bring thousands of members together to share their unique perspectives on engineering education. This is a significant factor in drawing new members to the organization to "develop [a] network of people who teach the same things" (an ASEE Member, personal communication, 2021). The results of these collaborations are compiled and published in the ASEE's Journal of Engineering Education. ASEE also actively runs various educational programs through government agencies and non-governmental organizations.

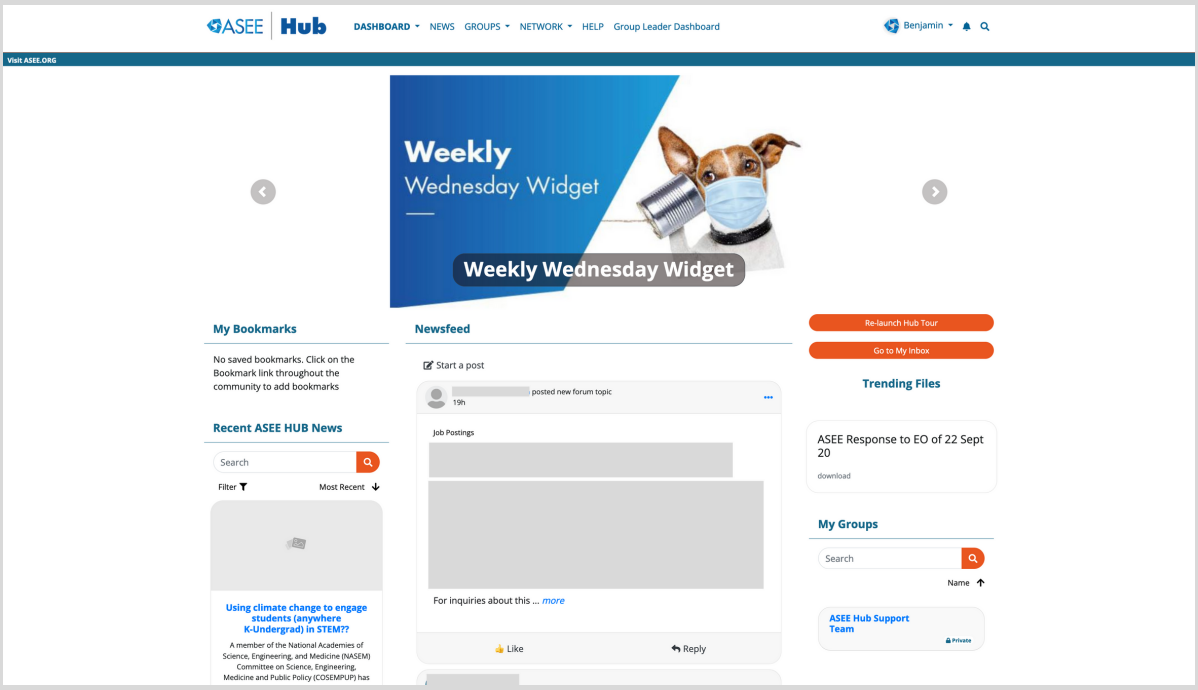
ASEE is also a strong advocate for multiculturalism and promotes inclusivity in engineering education. The organization offers over fifty divisions aimed at specific groups or disciplines such as the Women in Engineering division or the Material Sciences division. Apart from individual memberships, ASEE also offers institutional and corporate memberships with added benefits.

ASEE has always been at the forefront of engineering education, pioneering new ideas and teaching strategies. In the 1990s, ASEE experienced a surge in membership and recognition due to the growing tech field. This growth empowered the organization to promote engineering education and connections between educators in the United States. Currently, the efforts of ASEE are focused on communication and diversity within the field. Their efforts reflect this drive to include more people in engineering. Recently, ASEE has created the ASEE Hub to further achieve its goals in the digital age (an ASEE Employee, personal communication, 2021).

ASEE Hub

ASEE has established an online presence to achieve its main goal of "...advance[ing] innovation, excellence, and access at all levels of education for the engineering profession" (American Society for Engineering Education, 2015, para. 1). Launched in April of 2020, the Hub aims to replace the organization's conventional listservs by December of 2022. The platform provides two-way communication channels for members to connect outside of regular conferences and events.

An important aspect of ASEE for its members is the ability to connect with others who share similar interests. To achieve this, the Hub allows its users to join groups based on different engineering disciplines and social interests. Inside the groups, users can view discussions, share files, and see upcoming group events and news. The Hub also offers a general discussion page where users can start conversations and receive replies like traditional forums.



ASEE Hub 'My Dashboard', ASEE Hub
Source: https://aseehub.asee.org/my-dashboard

ASEE believed that the Hub would greatly benefit from research into user experience and marketing. This research would aid ASEE in its goal of improving the Hub.

User Experience

Organizations utilize UX research to gain insights into how consumers interact with their products. These insights then lay the foundations for the product's improvements along with a roadmap for the product's direction. This allows organizations to tailor their products to the consumers rather than the product team's vision. The ASEE Hub would benefit from applying the principles of UX research that drive it towards success.

User Experience, or UX, is how a user interacts with and experiences products or services ("User Experience Basics", 2014). UX also includes the user's perception of the product, as well as its ease of use and efficiency. According to Sauro (2015), the four main factors that determine the website user experience quality include usability, trust, appearance, and loyalty. The study analyzed over 4,000 responses on the user experiences of 100 websites based on reliable questionnaires such as the system usability scale. According to the study, websites should be easy to use, appealing, clean, and simple. They should also be easy to navigate, offer a pleasant experience, and be comfortable to use. (Sauro, 2015).

User Experience Design

UX design is a customer-driven design process that aims to facilitate positive user interactions with the products. Products are deliberately designed using market research, user analytics data, and human-behavior research (Hassenzahl, 2013). The purpose of UX design is to ensure "customer satisfaction and loyalty through the utility, ease of use, and pleasure provided in the interaction with a product" (Kujala et. al., 2011, p. 471). UX design also helps ensure that the user can quickly understand the goal and purpose of the product. This is critical in creating a positive user experience and retaining the target audience.

According to Hassenzahl (2013), the UX design model examines the Why, What, and How of a product. The Why addresses the motivation behind the user's intention to use the product. The What addresses the functions of the product. The How addresses the implementation of the product. This leads to a product design that provides "...meaningful, engaging, valuable, and aesthetically pleasing experiences" (Hassenzahl, 2013, p. 7).

One way to improve a website is to utilize a UX design model that first considers the users' needs. To achieve this, the user experience should not be static, and the products should evolve along with the user base's needs (Jetter & Gerken, 2007). Constant research and improvements should continue throughout the products' life cycles, allowing the products to expand and grow alongside their users. Design teams utilize this philosophy to create impactful products for their customers (Hassenzahl, 2013).

Usability

Usability is the practice of making things easy to use (Kuniavsky, 2010). In UX design, creating an easily usable product is imperative. Products with poor usability often drive users away due to the products' steep learning curve (Robert & Lesage, 2017). In UX design, usability is measured using a usability test that aims to identify and understand any potential issues.

According to Bangor et. al. (2008), a usability test based on the System Usability Scale, or SUS, was found to be a consistent method of measuring the usability of a system and predicting user satisfaction. SUS is a set of questions given to the users about their experience using the product (Brooke, 1996). SUS is a highly reliable metric for measuring a product's usability. SUS scores are measured on a curved grading scale shown in Figure 1 (Lewis & Sauro, 2016). In the last two decades, SUS has been a standard for the industry.

SUS Score Range	Grade	Percentile Range
84.1–100	A+	96–100
80.8–84	A	90–95
78.9–80.7	A–	85–89
77.2–78.8	B+	80–84
74.1–77.1	B	70–79
72.6–74	B–	65–69
71.1–72.5	C+	60–64
65–71	C	41–59
62.7–64.9	C–	35–40
51.7–62.6	D	15–34
0–51.7	F	0–14

Figure 1. A curved grading scale for SUS scores
Source: Lewis & Sauro, 2016

To improve the ASEE Hub's usability, the organization can conduct a SUS usability test to identify and understand any potential design issues. In the SUS usability test, a group of users performs certain tasks with the product. Following the completion of all tasks, participants are asked to rate their experiences with the SUS questionnaire. The questionnaire collects data such as users' behaviors, users' needs, and the time taken to complete the tasks. The results from the SUS usability test are compiled and used by a design team to quickly adjust and improve their products (Caddick & Cable, 2011). The application of this usability test is shown in Figure 2.

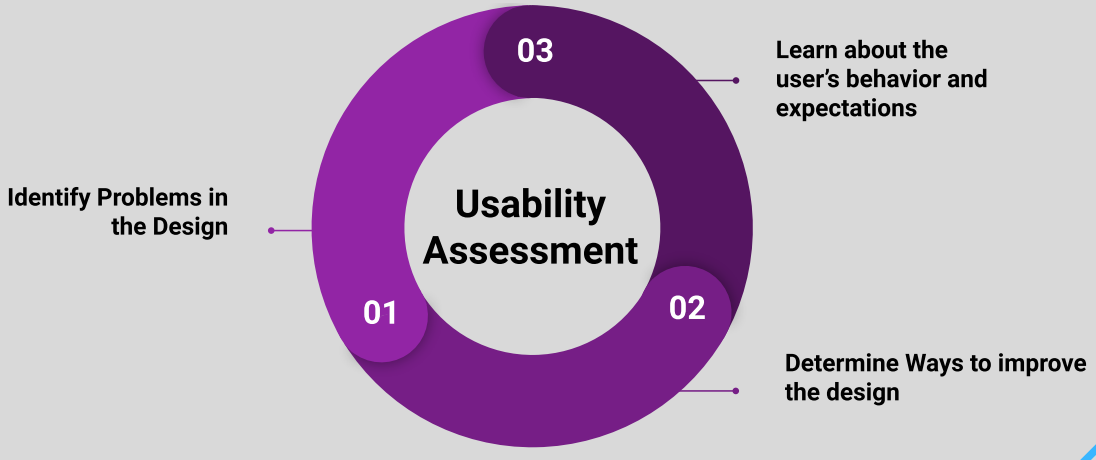
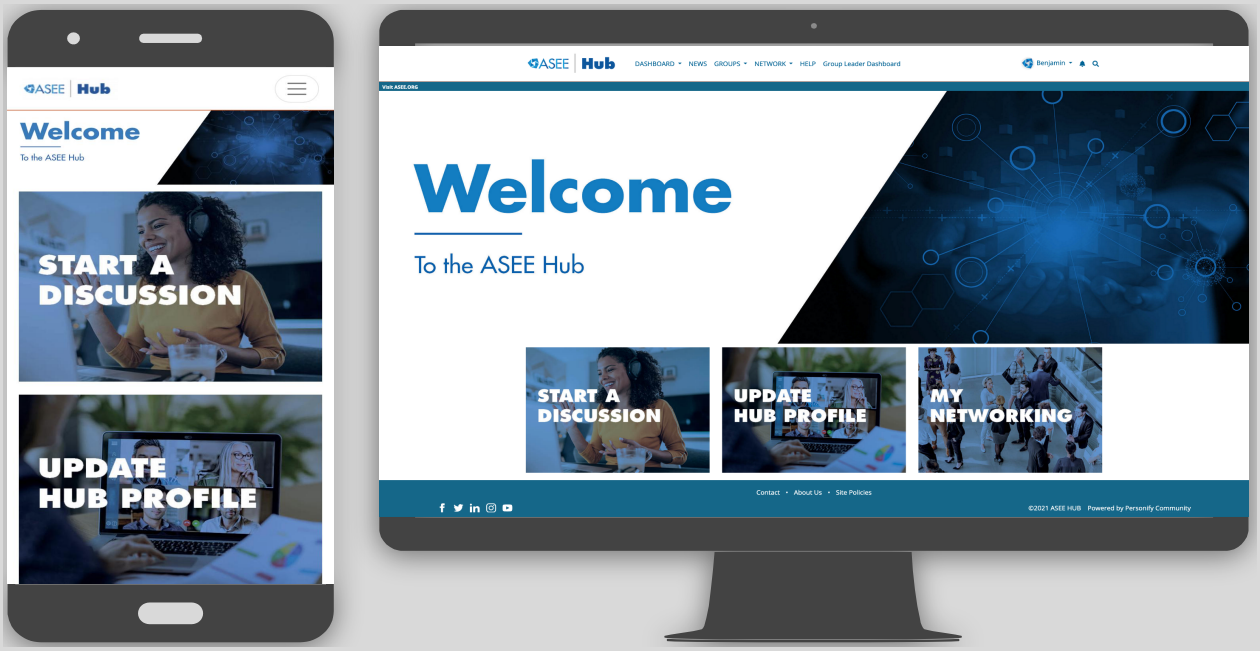


Figure 2. A diagram outlining the application of a usability test
Source: Created by WPI project team

Accessibility

Accessibility is defined as the practice of ensuring that all potential users can use the web (W3C, 2021). To make an accessible product, it is important to understand potential users and the tools they may use to access the product. This ranges from a traditional computer with a mouse and keyboard to devices such as a screen reader or a mobile phone.



ASEE Hub mobile layout (left) and desktop layout (right)
Source: Taken on mobile and desktop, https://aseehub.asee.org/home

According to Bai et al. (2019), Harper & DeWaters (2008), and Loiacono & Djamasbi (2011), A large percentage of websites, including corporate, educational, and governmental, often fail to meet industry accessibility standards. According to a study done by Bai et al. (2019) that focused on government website accessibility and usability, only 30% of the 342 sites examined met industry standards. The study also found a loose correlation between websites with high accessibility and usability scores. This suggests that websites with good accessibility also have better overall usability (Bai et al., 2019).

In the context of the Hub, understanding and improving the platform's accessibility is beneficial to create a welcoming online platform. Creating a platform with an overall positive user experience, strong usability, and accessibility will help draw in new users and retain current ones (Canziba, 2018).

Marketing and Consumer Behavior

Marketing and communication are critical components in drawing users to any product or service. Marketing refers to the advertisement or promotion of a product for an organization, and aims to "[attract customers to the] company's product or service." (Forsey, 2021, para. 11). One study found that the most effective ways to market a website were to use email and social media (Christina, Fenni, & Roselina, 2019). Without clear marketing and communication strategies, potential users are unlikely to be aware of the product's existence, much less use it (Choi et al., 2015). Therefore, marketers should understand their potential users in order to effectively establish a product. Currently, the ASEE utilizes daily and weekly emails (See Figure 3), and holds an active presence on Facebook and Twitter.

Figure 3: Daily Digest email from November 17, 2021
Source: Taken from ASEE Hub Daily Digest email

Marketers utilize consumer behavior analysis to assess the consumer's needs and provide ways to keep them engaged with a product (Gilaninia, Taleghani, & Azizi, 2013). According to Almeida et al. (2009) and Marios (2002), the personalization of a platform encourages users to find value in their interactions with the website, ensuring user engagement and retention. Consumer behavior analysis would aid the ASEE Hub in increasing and retaining the platform's user engagement. Assessing market research and consumer behavior analysis allows ASEE to understand its members' needs and tailor the Hub toward them.

Methodology

Research Parameters and Data Collection

To understand how the ASEE Hub performs and meets the members' needs, five primary types of information were gathered: 1) information on the Hub's active users and their online activities, 2) information on any design and navigation issues on the Hub, 3) information on what ASEE members know about the Hub and the potential features they would want, 4) information on the benefits that ASEE members gain from the organization, and 5) information on the goals and objectives of the ASEE Hub.

To gather the information above, the team utilized quantitative and qualitative data collection methods as shown in Figure 4.

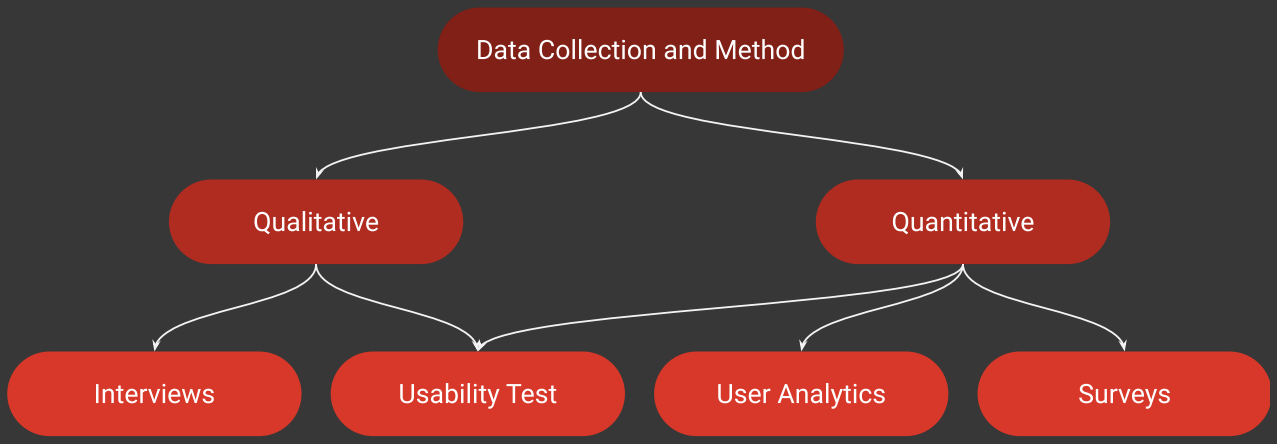


Figure 4. A diagram displaying the methods that the team will use to collect necessary data. Source: Created by WPI project team

First, the team conducted interviews with ASEE members and the ASEE Hub design team (See Appendix A and B). The interviewees were recruited through two channels as shown in Figure 6. All the interviewees identities remained anonymous. The team used the ASEE members' interviews to understand the benefits that ASEE members gain from the organization. The team also used the ASEE Hub design team's interviews to understand the Hub's vision.

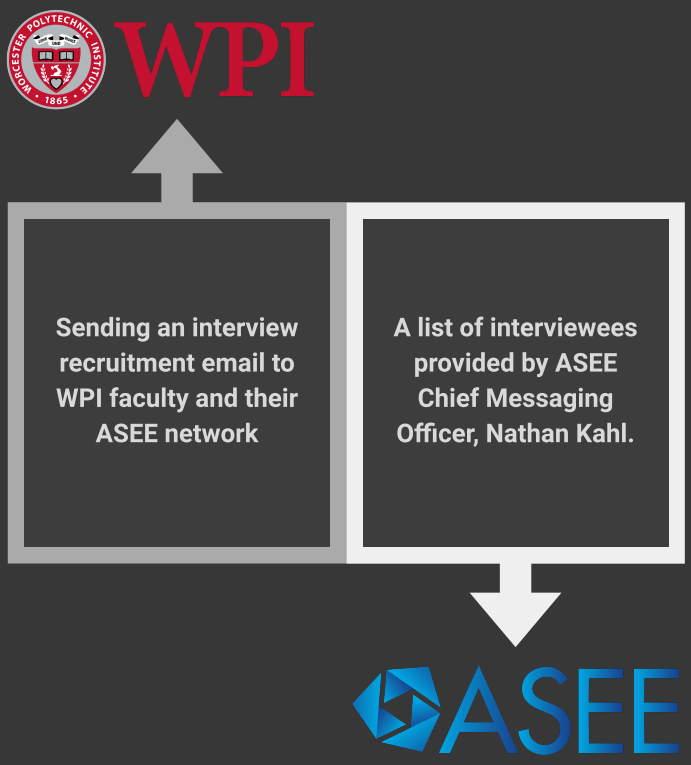


Figure 6: Recruitment channels for interviews
Source: Created by WPI project team

Second, the team conducted a usability test to determine the Hub's current usability. The test aimed to assess the user experience and how users interact with the Hub. The test sampled a number of WPI undergraduate students who had no previous experience with the ASEE Hub. The test asked participants to perform three tasks as shown in Figure 8. Participants were given a laptop with access to the Hub. Their actions and thoughts were observed and the time to complete each task was recorded. Following the test, each participant completed a system usability scale questionnaire (See Appendix D).

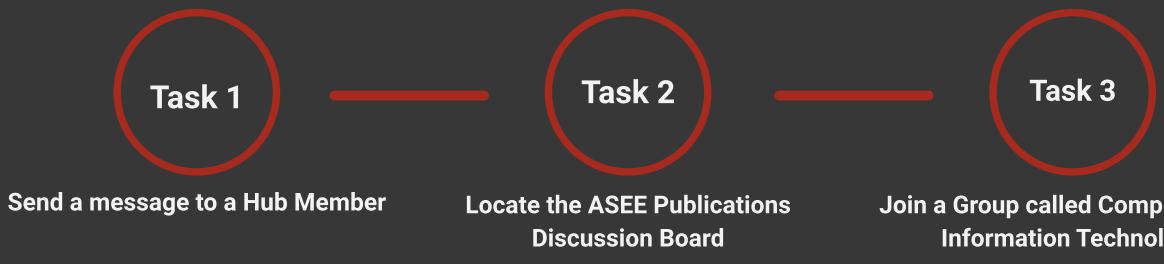


Figure 8: Tasks given in the usability test
Source: Created by WPI project team

Third, the team examined user analytics data to understand the activity of the Hub's users. User analytics refers to the data collection of the user's activity on the website such as how long the user spends on a page or what modules they interact with. The user analytics assessed Q3 of 2021. The team accessed the user analytics data through Personify, the ASEE's Customer Relationship Management service. The User Analytics Dashboard is shown in Figure 7.

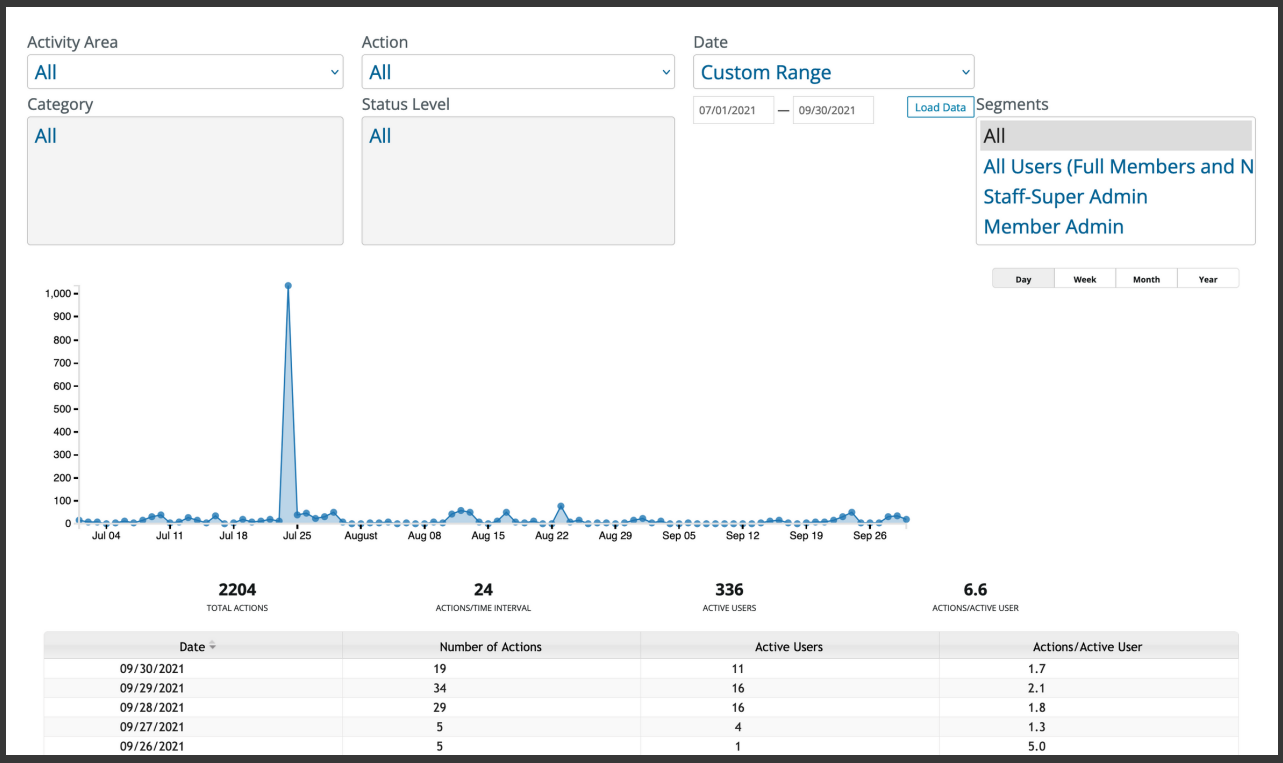


Figure 7: Personify user analytics dashboard
Source: ASEE Hub internal admin panel

Fourth, the team distributed an online survey to ASEE members to understand their experience with the Hub (See Appendix C). The survey was distributed through four channels as shown in Figure 5. All the survey responses were anonymous. The team utilized the survey data to identify patterns and trends on whether or not members are using the Hub, as well as feature requests and/or recommendations.

Figure 5: Survey distribution channels
Source: Created by WPI project team

Findings

ASEE members and their needs

To understand the current ASEE membership, information about member demographics was necessary. From data supplied by ASEE, the organization's membership is shown in Figure 9. Additionally, from the survey the team conducted, membership spans professional, institutional, and even retirees; the majority being members for more than 10 years (See Figure 10).

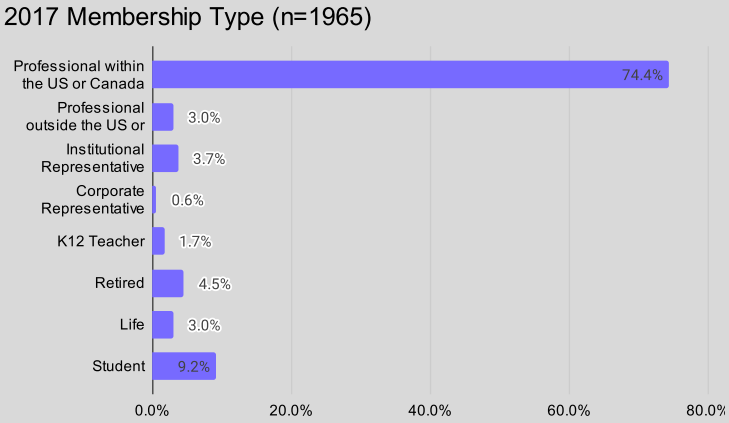


Figure 9: ASEE membership
Source: 2017 ASEE member needs internal survey

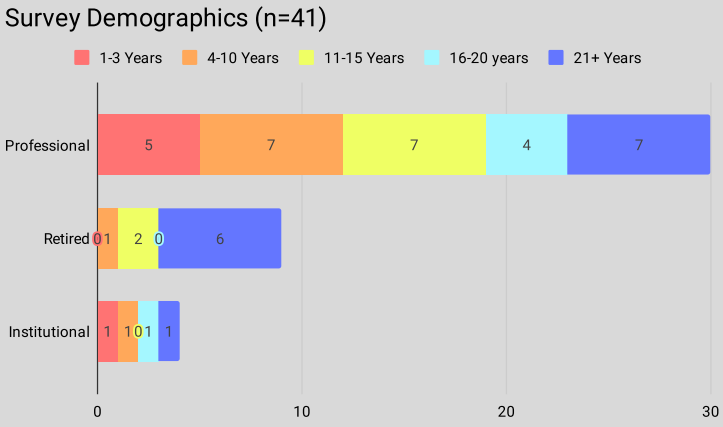


Figure 10: Survey demographics
Source: Created by WPI project team

As the scope of the project was focused on the ASEE Hub, the team needed to understand how members within the ASEE are currently communicating. Throughout our interviews with ASEE members, the team discovered that members use traditional email listservs, group-designated webpages, and other messaging services such as Slack.

Moreover, the survey results indicated that the majority of ASEE survey respondents greatly value the benefits from ASEE shown in Figure 11.

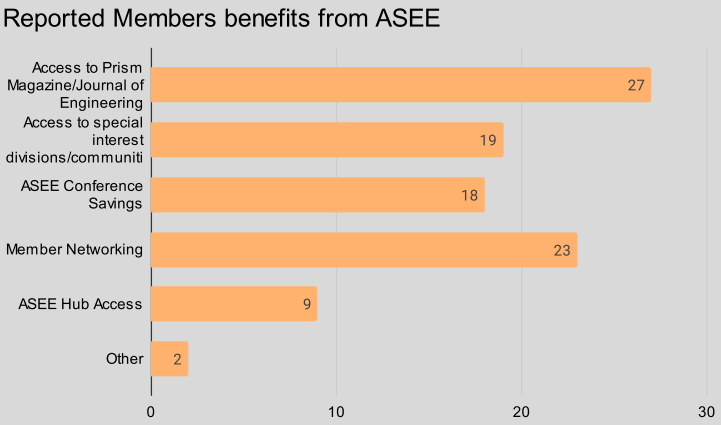


Figure 11: Members benefits from ASEE
Source: Created by WPI project team

Current State of the ASEE Hub

During the evaluation of the ASEE Hub, the team noticed that activity on the site was fairly limited. Using user analytics collected through the Personify dashboard as well as data supplied by ASEE, the team was able to gain valuable insights into the current performance of the ASEE Hub.

Throughout 2021, ASEE has been actively importing and adding its member base to the Hub (ASEE IT Team member, personal communication, 2021). Newly added members receive an email with a link to create their ASEE Hub account and profile. Users are counted as "New" when they officially create their accounts. The membership increase is shown in Figure 12.

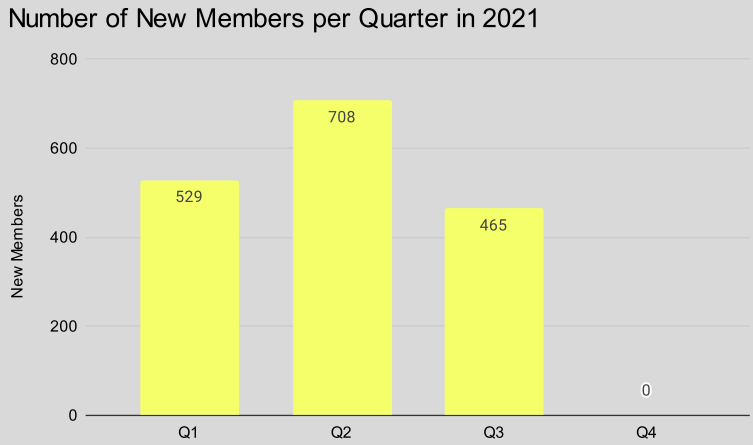


Figure 12: Number of new members on the ASEE Hub per quarter
Source: Internal ASEE Hub admin panel

In the survey sent out to ASEE members, the team asked about comments and suggestions for the Hub. Two respondents mentioned issues with not knowing about their invitation to join the Hub or the inability to log into the Hub and officially create their account.

Additionally, the team utilized user analytics to assess whether members are using the site or not. The team collected data on the number of active users per quarter as of December 1st, 2021 (See Figure 13). The active user is defined as a user who takes any action on the Hub.

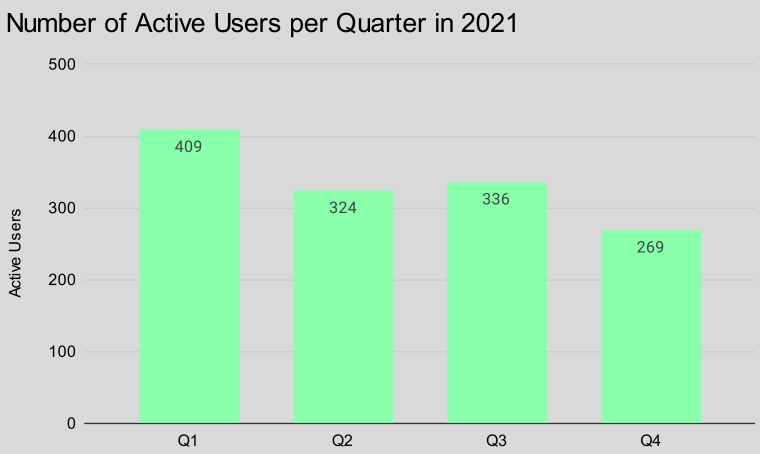


Figure 13: Number of active users on the ASEE Hub per quarter
Source: Internal ASEE Hub admin panel

The team also targeted metrics called "Forum Topic Create" and "Forum Topic Reply". The team selected these two categories to emphasize the interactions between members. The data was collected over the most recent quarter (Q3 of 2021) and is shown in Figures 14 and 15. There were a total of 21 topics created. However, these topics were only met with two replies.

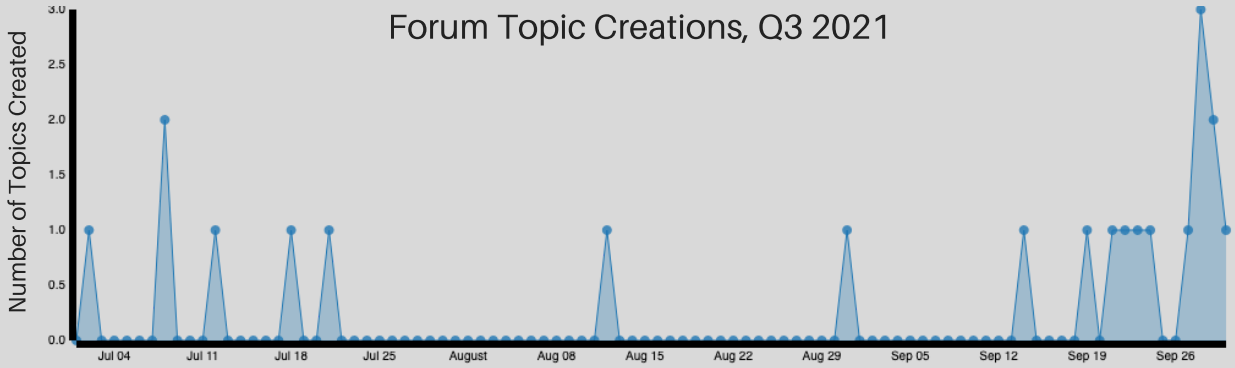


Figure 14: User analytics - forum topic creations
Source: Internal ASEE Hub admin panel

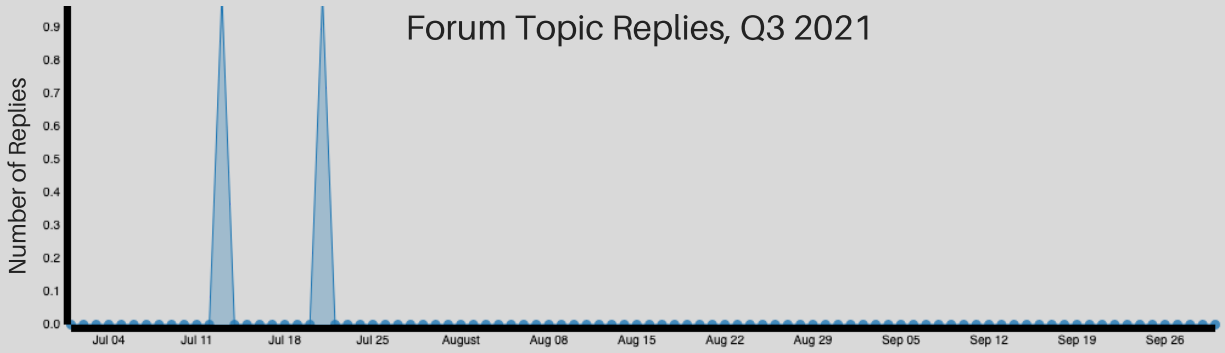


Figure 15: User analytics - forum topic replies
Source: Internal ASEE Hub admin panel

Although the survey was sent out to all ASEE members (~12,000 members), the team only received 41 responses. 75.60% (31/41) of the respondents reported that they have heard of the Hub. The respondents were then asked how frequently they use the Hub, ranging from "I never use the Hub" to "I regularly/frequently use the Hub". More than two-thirds of the respondents never or rarely use the Hub. This demonstrates that the ASEE Hub is underutilized. This survey data is shown in Figure 16.

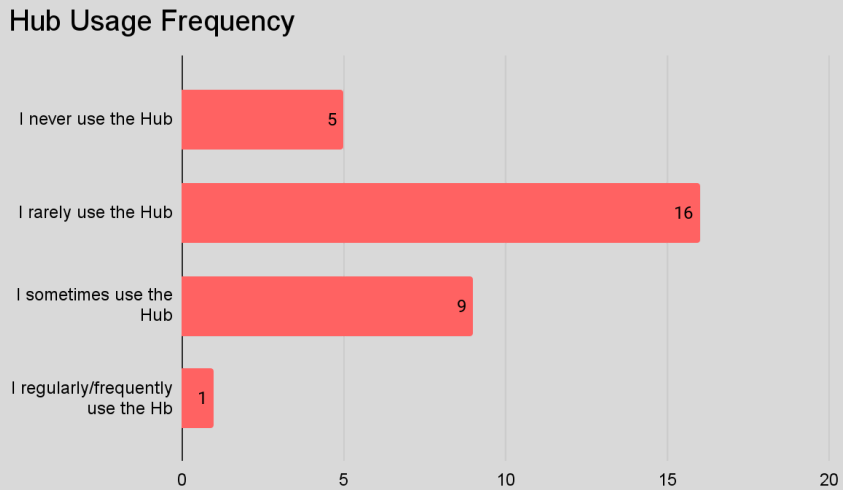


Figure 16: Hub members usage
Source: Created by WPI project team

Current State of the ASEE Hub (continued)

The survey then asked users who had experienced the Hub on the features they regularly use. The majority of the responses indicated that they benefitted from ASEE News and Press Releases on the ASEE Hub. While others generally use the Hub for members/community communications and job postings. This data is shown in Figure 17.

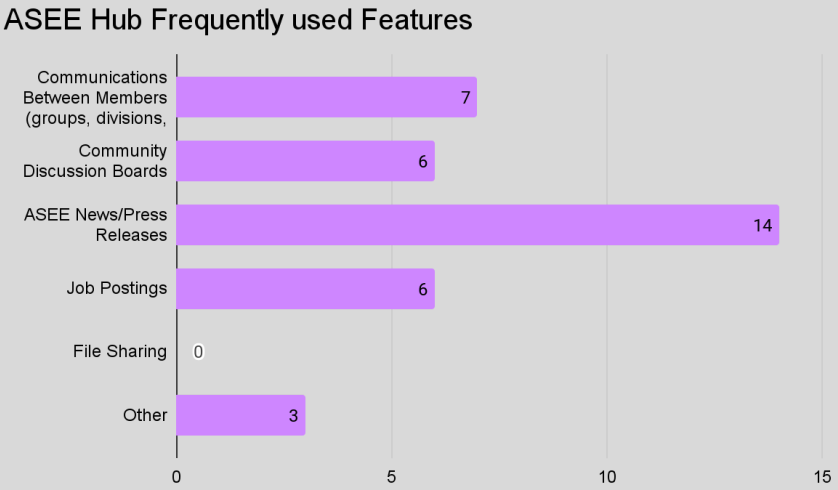


Figure 17: Hub frequently used features
Source: Created by WPI project team

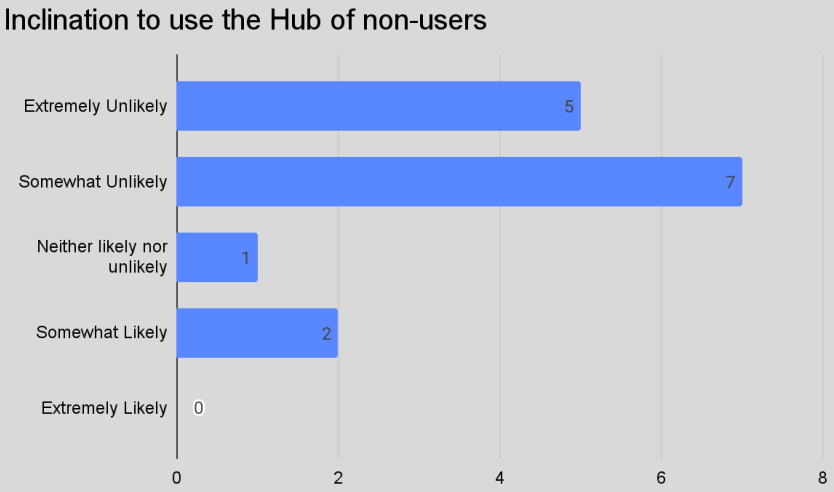


Figure 18: New Users tendency to use the Hub
Source: Created by WPI Project Team

On the other hand, 24.39% of respondents (10/41) reported that they are not aware of the ASEE Hub. These members, along with users who are aware of the Hub but never used it (11.62%, 5/41), were shown a brief description of the Hub and its current features. They were then asked about their inclination to use the Hub. Their responses are shown in Figure 18.

The survey also inquired about any comments about the Hub or feature suggestions. The comments were categorized and coded for ease of analysis. While 58.5% of the responses had no comments, the most predominant category was "Promotion of Educational Resources" with 35.3% of participants (6/17). The categorized comments are shown in Figure 19.

Comment/Suggestions	Frequency
Promotion of Educational Resources	6
Decrease Hub Email Frequency	3
Clearer Communication Channel	2
Easier Logins and Better UI/UX design	2
Conference News	1
Mobile Application	1
Clearer Networking Tool (Link to Slack etc.)	1
Free Access to staffs	1
Not Applicable	24

Figure 19: ASEE Hub comments/suggestions
Source: Created by WPI project team

How does the Hub perform?

From the tests and the questionnaire (See Appendix D), the team uncovered valuable insights into how users navigate and view the site. Following the questionnaire, the scores were adjusted to a 100-point scale. The compiled scores are shown below in Figure 20. The average rating across all participants was 47.125. For comparison, SUS scores of popular internet tools are the following: Microsoft Excel - 56.5, Amazon.com - 81.8, Gmail.com - 83.5, and Google.com - 93.4 (Kortum & Bangor, 2013).

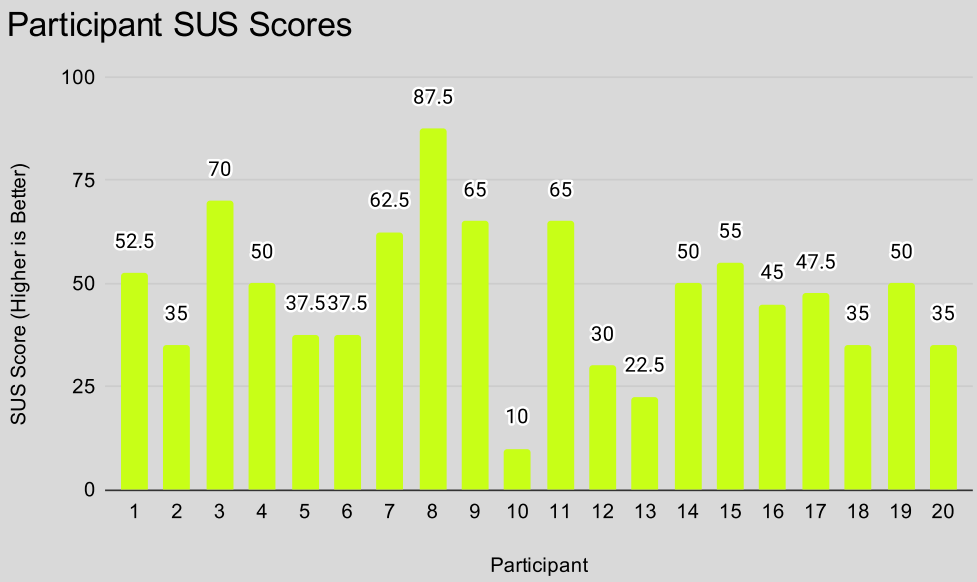


Figure 20: SUS response data (see Appendix D for questions)
Source: Created by WPI project team

Throughout the 20 usability tests, users consistently found that features of the site were not well integrated and slightly confusing. 60% (12/20) of users had issues with locating the join button on the group's page. Many users were able to quickly find the group itself and then often took the same amount of time to find the join button on the group page. According to the team's observations, many participants found the website to be convoluted and confusing, struggling with understanding the purpose of each page. When attempting to send a message as part of the test, several participants were confused by the home page and went to the "Start a Discussion" page to begin their task. The tasks were designed to be simple and similar to what an ASEE member may complete. The time to complete each of these tasks is reflected in Figure 21.

	Task 1 / sec	Task 2 / sec	Task 3 / sec	Total Time / sec
Average Time	96.26	70.42	70.89	237.56
Fastest Time	38	15	37	131
Slowest Time	318	229	116	607

Figure 21: Times from the usability study
Source: Created by WPI project team

Discussion

What does the data show?

The data revealed several important issues with the Hub.
First, the team gained a much better understanding of both the ASEE's vision for the Hub and the ASEE members needs. Based on the interviews with the ASEE IT Team, the Hub was designed to serve as a communications platform intended to replace older email listservs. Specifically, the Hub would allow for two-way communication between division heads and ASEE members. Additionally, the Hub was intended provide a centralized platform for various ASEE divisions and groups. Interviews with ASEE members, along with the survey results, suggested that ASEE members do find ASEE's vision for the Hub valuable. However, many interviewees reported that there are currently few incentives for them to transition from their current "*ways of doing things*" to the ASEE Hub (an ASEE employee, personal communication, 2021).

Second, the team learned that the Hub has issues with usability and accessibility. This was primarily found through the usability tests that the team conducted, and the team's observations of the Hub. In the tests, many users had difficulty completing simple tasks that Hub users would be expected to do regularly. These tasks include navigating through the Hub to find general resources or searching for a division of interest. Several gave up attempting to navigate the Hub entirely, and used a search function to try to find what they were looking for. In addition to this, several technical issues within the Hub were observed, such as non-functional search bars, empty folders, and an interface that was not always intuitive.

Third, the team determined that one of the critical issues with the ASEE Hub is that it is simply not used by members. This is a compounding problem, as when members arrive on the Hub it appears to be deserted, a "*ghost town" (ASEE Hub related personnel, personal communication, 2021).* This discourages members from using the Hub that creates a snowball effect to new users in a similar manner. This is supported by the user analytics data that the team uncovered, which showed a low number of discussions and replies.

Fourth, ASEE members are not fully aware of the Hub despite the Hub's goal in replacing the organization's listservs by December 2022. In interviews with the ASEE IT Team, several members suggested that the lack of marketing of the Hub has been a major oversight in the push for members' transitions. The survey and interviews with ASEE members suggested that many knew about the Hub, but most did not see a reason to use it over their current systems.

Finally, the team learned that there are not enough resources to support the ASEE Hub. According to the interviews and research, in website development, the early stage is crucial in gaining users and encouraging engagement. This is most often done through the use of a dedicated community manager whose role is to encourage conversations and collaborations. This is indicative of whether on not the website will be successful. This is seen in examples of other community Hubs, such as those for the Institute of Engineering and Technology and the Society of Manufacturing Engineers. The ASEE Hub does not currently have a community manager to encourage conversations. Moreover, there seems to be a lack of maintenance of the Hub. For example, news about ASEE conferences, an integral part of the organization, has not been updated since July 2021. At the time of writing, this is nearly six months out of date.

Interpretations and Implications

The data shows that the ASEE Hub is not meeting the needs of the users, or the goals of the ASEE. First, not enough members know about the Hub or see the value in it to transition to the new system. Second, there is very little overall user activity on the hub which results in weaker user retention and an inability to increase the user base. Third, the platform suffers from usability and navigation issues. This negatively impacts users' experience and makes the platform less enticing. Fourth, there is a limited marketing effort to inform users about the Hub. This results in many ASEE members either not knowing about the Hub or not feeling the need to use it. Finally, the ASEE Hub has little community management, resulting in a discouraging environment for new users.

Recommendations

The data indicated several clear issues with the ASEE Hub: poor usability and navigation, an inactive user base, failure to meet the needs of ASEE members and the goals of ASEE administration, and a lack of administrative support. Each of these issues has several potential solutions.

Usability and Navigation issues:

- Simplifying pages through reducing the amount of content and links on the screen
- Removal or redesign of the Hub's landing page
- Fixing or removing broken and unused features such as the group search bar

The Hub's inactive user base:

- A concerted effort of marketing the platform to ASEE members through current channels such as the email listservs and ASEE conferences.
- Improving the Hub's user experience to improve overall user retention

Failure to meet ASEE members' needs:

- Conduct surveys and interviews with ASEE members on a larger scale to understand what the Hub is missing
- Improve the ASEE Hub to be an appealing alternative to members' current system for communication and collaboration.

Marketing and communication:

- Increase member awareness of ASEE's intentions and goals with the Hub
- Consistent marketing through active channels such as listservs and social media
- Complete and successful transfer of ASEE communication to the Hub
- Better integration of division communication on the Hub

Lack of updates and administrative support for the Hub:

- Providing an overall update to the content featured on the Hub
  - Dashboard banner advertises the conference which occurred in July
  - Discussions have 2 posts from July pinned at the top.
- Ensuring new posts are responded to in a timely manner to foster an active community

Research limitations

During the data collection process, the team encountered several difficulties that limited the scope of the final conclusions. First, the survey had a very low response rate. The survey was sent to over 30,000 ASEE affiliates repeatedly over several weeks, and the team only received 41 valid responses to analyze. This small sample meant that conclusions the team drew about how ASEE members think, and what they would like to see from the Hub may not be representative of the entire ASEE community. Additionally, the team was not able to interview as many ASEE members as was originally planned. All members interviewed were also WPI faculty, as a result, the conclusions reached from the interview data may not be representative of all ASEE members. Furthermore, the Usability test was primarily conducted on college students, not ASEE members which may have influenced the results of the study. Finally, while the analytics data the team received was generally valid, some administrative actions on the site meant that some data appeared misleading, which was taken into account during the analysis.

Future Research

The ASEE could benefit from performing similar research on a larger scale. Examples of this would include performing usability testing with ASEE members, a larger scale survey of members about the Hub, and a more in depth market research process to better understand user needs. The ASEE could also benefit from further cooperation with Personify, as their ongoing recommendations for the Hub may be helpful.

Conclusion

The ASEE Hub is an online communication and collaboration platform designed for members of the American Society for Engineering Education. The platform was intended to move ASEE into the digital age and away from older methods of communication such as listservs. ASEE tasked us with examining the platform and finding paths of improvement. The team utilized the principles of User Experience design, including usability and accessibility, as well as market research as a basis for the project.

The team collected necessary data through surveys, interviews, a user analytics tool, and a usability test. The team found that there is a lack of knowledge about the benefits of the Hub within ASEE membership, a Hub site that can be confusing to some users, and a Hub community that has not been given the opportunity to grow and become self-sustaining.

Based on these conclusions we made several recommendations to the ASEE that we believe would help meet their goals. One important recommendation is that the ASEE should, if possible, have a staff member act as a community manager for the Hub. Additionally, we recommend that the ASEE provide more incentives for members to move to the Hub, particularly for communication with the organization and within divisions.

Our Experiences

Washington D.C IQP was a great experience. I learned to operate autonomously and take ownership of the project. Aside, I thoroughly enjoyed the city and all the beautiful places.
- Sirut Buasai

I enjoyed my time in D.C and it was fantastic seeing the project come together. Proud of the team for coming together and excellent dynamics.
- Benjamin Schmitt

I found the overall experience to be pleasant. Being able to work on an extended project and watching it progress through the weeks was a beneficial life experience.
- Jason Odell

I have enjoyed the experience of working on a single, longer-term project, with a dedicated team whom I got to know. Being in Washington DC was also a fun experience.
- Jacob Moore

References

American Society for Engineering Education, ASEE Hub (n.d) *About*. https://international.asee.org/about/

Almedia, V., Benevento, F., Cha, M., Rodrigues, T. (2009). "Characterizing user behavior on online social networks." *Association of Computing Machinery,* 49-62.

Bai, Y., Grzeslo, J., Wang, R., Min, B., & Jayakar, K. (2019). Does accessible design benefit general users of E-government? examining the relationship between website usability and Accessibility. *SSRN Electronic Journal*. https://doi.org/10.2139/ssrn.3427413

Bangor, A., Kortum, P., & Miller, J. (2008). An empirical evaluation of the system usability scale. *International Journal of Human-Computer Interaction, 24*(6), 574-594

Brooke, J. (1996). SUS-A quick and dirty usability scale. *Usability Evaluation in Industry,* 189(194), 4-7.

Caddick, R., & Cable, S. (2011). A practical guide for creating useful UX documentation. (1st ed.). *Communicating the User Experience.* John Wiley & Sons, Incorporated.

Canziba, E. (2018). Design, prototype, and implement compelling user experiences from scratch. Packt Publishing, Limited. In Hands-On UX design for developers https://www.indeed.com/career-advice/career-development/user-interface.

Choi, J., Choi, S., Chihyung, O. (2015). Outcomes of destination marketing organization website navigation: the role of telepresence. *Journal of Travel and Tourism Marketing,* 33(1): 46-62.

Christina, I. D., Fenni, F., & Roselina, D. (2019). Digital marketing strategy in promoting product. *Management And Entrepreneurship: Trends Of Development*, 4(10), 58-66.

Forsey, C. (2021, February 25). What is marketing, and what's its purpose? HubSpot Blog. Retrieved October 8, 2021, from https://blog.hubspot.com/marketing/what-is-marketing.

Gilaninia, S., Taleghani, M., & Azizi, N. (2013). Marketing mix and consumer behavior. *Kuwait Chapter of the Arabian Journal of Business and Management Review,* 2(12), 53.

Harper, K. A., & DeWaters, J. (2008). A Quest for website accessibility in Higher Education Institutions. *The Internet and Higher Education*, 11(3-4), 160–164. https://doi.org/10.1016/j.iheduc.2008.06.007

Hassenzahl, M. (2013). User experience and experience design. *The encyclopedia of human-computer interaction,* 2. https://www.researchgate.net/profile/Marc-Hassenzahl/publication/259823352_User_Experience_and_Experience_Design/links/56a7352d08ae997e22bbc807/User-Experience-and-Experience-Design.pdf.

Henry, S. L. (Ed.). (2021, October 6). Introduction to Web Accessibility. W3C. Retrieved November 11, 2021, from https://www.w3.org/WAI/fundamentals/accessibility-intro/.

Jetter, C., & Gerken, J. (2007). A simplified model of user experience for practical application. In NordiCHI 2006, Oslo: The 2nd COST294-MAUSE International Open Workshop" User eXperience-Towards a unified view" (pp.106-111). http://kops.uni-konstanz.de/handle/123456789/5972.

Kortum, P. T., & Bangor, A. (2013). Usability ratings for everyday products measured with the system usability scale. *International Journal of Human-Computer Interaction,* 29(2), 67-76.

Kujala, S., Roto, V., Väänänen-Vainio-Mattila, K., Karapanos, E., Sinnelä, A. (2011). UX Curve: A method for evaluating long-term user experience. *Interacting with Computers,* 23(5), 473-483 https://doi.org/10.1016/j.intcom.2011.06.005

Kuniavsky, M. (2010). Smart things: Ubiquitous computing user experience design. *Elsevier Science & Technology.* https://doi.org/10.1016/C2009-0-20057-2

Loiacono, E. T., & Djamasbi, S. (2011). Corporate website accessibility: Does legislation matter? Universal Access in the Information Society, 12(1), 115–124. https://doi.org/10.1007/s10209-011-0269-1

Marios, K. (2002) "Applying the technology acceptance model and flow theory to online consumer behavior" *Information Systems Research.* 13(2): 205-233.

Robert, J. M., & Lesage, A. (2017). Designing and evaluating user experience. *The Handbook of Human-Machine Interaction* (pp. 321-338). CRC Press.

Sauro, J. (2015). SUPR-Q: A comprehensive measure of the quality of the website user experience. *Journal of Usability Studies*, 10(2).

Sauro, J., & Lewis, J. R. (2016). Quantifying the user experience: *Practical statistics for user research* (p. 204). Morgan Kaufmann

User experience basics. Department of Health and Human Services. (2014, February 19). Usability.gov. https://www.usability.gov/what-and-why/user-experience.html.

Appendices

Appendix A: ASEE members interview script

Hello, our names are Ben Schmitt, Sirut Buasai, Jacob Moore, and Jason Odell. We are from WPI and will be working with ASEE for the next 2 months. We are working on creating a Website Performance Review for the ASEE Hub and creating a plan for improvements. We would like to ask you a few questions about ASEE and the Hub as well as any opinions you may have. Anything that you say will only be used in relation to our project about the ASEE Hub, and anything you say regarding any other topics will not be recorded. Your identity in this interview will be anonymous, we will not record your name or any identifying information, and will not connect you with your words in our report. If you want your responses to be confidential, we will exclude any identifying information from your responses.

General questions:

1. What is your involvement with ASEE?
    a. How long have you been involved with ASEE?
2. Why did you join the organization?
    a. What do you do as a member?
    b. What does the organization provide to you?
3. What kind of connections have you made during your time with ASEE?
    a. How have you made them?
    b. How do the connections/social aspects keep you involved with ASEE?
4. Do you view ASEE as more of a professional networking medium, or a social, community oriented one?
    a. How has this changed over time, if at all?
5. How do you make connections, and keep in contact with those connections, in ASEE.
    a. Do you use online services to do this?
        i. If so, what are they, and why do you use them?
6. What would you look for in an online communications platform?
    a. How would you think of a platform that allows you to keep in contact with the ASEE Network?
    b. How would you think of a platform that allows you to collaborate with other ASEE members?
    c. How would you think of a platform that allows you to keep up-to-date with ASEE organizational news?
    d. How would you think of a platform that allows you to see any new engineering education job postings?

Appendix B: ASEE employee interview script

Hello, our names are Ben Schmitt, Sirut Buasai, Jacob Moore, and Jason Odell. We are from WPI and will be working with ASEE for the next 2 months. We are working on creating a Website Performance Review for the ASEE Hub and creating a plan for improvements. We would like to ask you a few questions about ASEE and the Hub as well as any opinions you may have. Anything that you say will only be used in relation to our project about the ASEE Hub, and anything you say regarding any other topics will not be recorded. Your identity in this interview will be anonymous, we will not record your name or any identifying information, and will not connect you with your words in our report. If you want your responses to be confidential, we will exclude any identifying information from your responses.

General questions:

1. What is your role in the ASEE?
2. What was your background before joining ASEE?
    a. Were you involved in engineering education?
3. How long have you been a part of ASEE (as a member/employee)?
4. What drew you to work at ASEE?
    a. Why did you join?
    b. Were you a member before you began working for ASEE?
5. How involved were you in the creation of the Hub?
    a. If involved in the design process
        i. What did you specifically contribute to?
        ii. Were there any inspirations behind your design choices?
        iii. Could you explain more about the design process?
    b. If involved in marketing process
        i. What did you specifically contribute to the marketing?
        ii. What were the marketing efforts?
        iii. How do you think the hub draws in members?
6. What is the main goal behind the ASEE Hub?
    a. How is the hub currently being used and does this work as intended?
7. What do you think are the Hub's strengths and weaknesses?
8. What would a successful Hub look like to you?

Appendix C: ASEE members survey questions

Intro

We are a student team from Worcester Polytechnic Institute (WPI) working with ASEE to evaluate the ASEE Hub. Our project aims to improve the Hub by assessing the current trends of the site. Your participation will help us understand how members interact with the site.

Please answer all questions to the best of your ability. All submissions are confidential and can only be viewed by our project team. By taking this survey, you agree to have your responses collected, analyzed and potentially used in our final report in a summarized way, not individual.

Thanks for taking the time to complete our survey!

What is your affiliation with ASEE?

- ○ Professional
- ○ P-12 Educator
- ○ Student
- ○ Retired
- ○ Other

Approximately, how long have you been a member of ASEE?

- ○ 1-3 Years
- ○ 4-10 Years
- ○ 11-15 Years
- ○ 16-20 Years
- ○ 21+ Years

What do you find most valuable as a member of ASEE? (Check all that apply)

- ☐ Access to Prism Magazine/Journal of Engineering Education
- ☐ Access to special interest divisions/communities
- ☐ ASEE Conference Savings
- ☐ Member Networking
- ☐ ASEE Hub Access
- ☐ Other

Please list up to 3 divisions for which you have the most interest (separated by a comma).

Are you familiar with the ASEE Hub?

- ○ Yes
- ○ No

How did you learn about the Hub?

- ○ ASEE Conferences
- ○ ASEE Website
- ○ ASEE Press Releases
- ○ Another ASEE Member
- ○ Other

How active are you on the ASEE Hub?

I have never used the Hub	I rarely use the Hub	I sometimes use the Hub	I use the Hub frequently/regularly
○	○	○	○

What features do you use in the Hub?

- ☐ Communications between Members (groups, divisions, committees, personal messages)
- ☐ Community Discussion Boards
- ☐ ASEE News/Press Releases
- ☐ Job Postings
- ☐ File Sharing
- ☐ Other

The ASEE Hub is a collaboration space for ASEE members. The following are some of the Hub's features:

- Communication between members within various groups, divisions, committees, sections, etc.
- Community Discussion boards.
- ASEE News/Press Releases
- Job Postings
- File Sharing Space

Given the Hub's features, how likely would you use the Hub?

- ○ Extremely unlikely
- ○ Somewhat unlikely
- ○ Neither likely nor unlikely
- ○ Somewhat likely
- ○ Extremely likely

What features would you like to see from the Hub?

What is your current age cohort?

- ○ 18-25 years old
- ○ 26-33 years old
- ○ 34-45 years old
- ○ 46-65 years old
- ○ Over 65 years old

What is your gender identity?

- ○ Male
- ○ Female
- ○ Non-binary / third gender
- ○ Prefer not to say

Appendix D: system usability scale questionnaire

I like the design and experience of this website

	1	2	3	4	5	
Strongly Disagree	○	○	○	○	○	Strongly Agree

I found the site unnecessarily complex

	1	2	3	4	5	
Strongly Disagree	○	○	○	○	○	Strongly Agree

I thought the site was easy to use

	1	2	3	4	5	
Strongly Disagree	○	○	○	○	○	Strongly Agree

I think I would need help of a technical person to use this site

	1	2	3	4	5	
Strongly Disagree	○	○	○	○	○	Strongly Agree

I found the functions of this site well integrated

	1	2	3	4	5	
Strongly Disagree	○	○	○	○	○	Strongly Agree

I thought there was too much inconsistency in the site

	1	2	3	4	5	
Strongly Disagree	○	○	○	○	○	Strongly Agree

I would imagine most people would learn to use this site very quickly

	1	2	3	4	5	
Strongly Disagree	○	○	○	○	○	Strongly Agree

I found the site very cumbersome

	1	2	3	4	5	
Strongly Disagree	○	○	○	○	○	Strongly Agree

I felt confident using the site

	1	2	3	4	5	
Strongly Disagree	○	○	○	○	○	Strongly Agree

I need to learn a lot before I could properly use this site

	1	2	3	4	5	
Strongly Disagree	○	○	○	○	○	Strongly Agree