

## Case Study: Platypus, a Multi-Platform AI Chatbot to Recommend Campus Makerspaces

### 1. Site Introduction

Located in Capen Annex, the DTI is a makerspace dedicated to design justice principles, human-centered design, and interdisciplinary making. All Smith students, faculty, and staff are welcome to use the DTI's resources—which include laser cutters, a vinyl cutter, 3D printers, sewing machines, crafting materials (paint, paper, fabric, etc), and power tools—for personal or academic projects. The DTI is overseen by Emily Norton (Director), Kathy Guo (Prototyping Studio Manager), Jennifer Kennedy (Administrative Assistant), Alix Gerber (Post-Graduate Fellow), and student staff called Studio Design Partners. In our user research, we found that the DTI is highly utilized and highly regarded. Over 1000 students signed into the DTI during the 2022–23 academic year according to the DTI's By the Numbers report, and survey respondents positively described the DTI as a supportive community filled with resources.



Figure [1]: The DTI Common Area

Though the DTI was the lens through which we started our project, as our project progressed, we found that the DTI is part of a larger ecosystem of makerspaces at Smith College. So, to get the best grasp on our site, we expanded our focus to Smith makerspaces in general, and designed our final prototype for all students who want to build projects using makerspace resources at Smith.

### 2. Research Question & Methodology

The research aimed to uncover the factors distinguishing individuals who utilize the Design Thinking Initiative space (DTI) from those who express interest but refrain from engagement. Employing a mixed-methods approach, the study conducted 30–45 minute semi-structured interviews, comprising seven participants encompassing diverse perspectives: Emily Norton and Kathy Guo, respectively the DTI Director and Prototyping Studio Manager, two student members of the Student Design Partners (SDP) program, and three non-SDP students. Recruitment tactics involved a survey exclusively for interview sign-up times, a makerspace survey featuring a sign-up question, and direct communications with the DTI Director and the Prototyping Studio Manager.

Findings revealed contrasting attitudes among participants: SDPs displayed the highest enthusiasm, focusing predominantly on DTI-related matters, while non-SDP students primarily critiqued the broader makerspace landscape at Smith. Notably, Emily and Kathy were solely queried about the DTI.

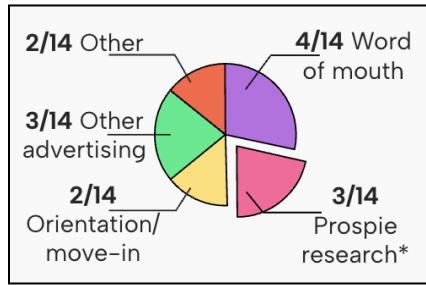
A Google Form survey garnered 15 responses, leveraging strategically placed flyers and digital communications on platforms like Discord and Slack. The survey posed 28 questions for DTI users and 18 for non-users, with four respondents volunteering for interviews. Analysis of free-response questions yielded insights into user experiences, with an average of five questions addressed per respondent. Noteworthy demographic skew emerged from respondents likely sourced via the CS Department Discord, predominantly comprising CS majors.

Supplementary quantitative data encompassed OneCard sign-in times and the 2022–23 Academic Year By-the-Numbers Report, provided by Emily and Kathy. These metrics, intended to illustrate DTI utilization, covered sign-ins from September 5, 2023, to March 12, 2024.

Overall, the research amalgamated qualitative interviews and quantitative data to discern the factors influencing DTI engagement, shedding light on user behaviors and perceptions within the Smith College makerspace ecosystem.

### **3. Exploratory Findings**

While our question indicated that we expected to find students who didn't go to the DTI, we found that people who want to use the DTI seem to be using it. Fourteen out of fifteen of our survey respondents had been to the DTI. Respondents had learned of the DTI in a variety of ways (see Figure [2]) and none had discovered it via searching the Smith website as a current student. Extrapolating, there is not an effective advertising avenue for makerspaces at Smith, and the Smith website does not appear to be an effective way to disseminate information to current students. This shows the need for a wider range of advertising strategies at Smith, and justifies the DTI's efforts to use diverse advertising strategies.



*Figure [2]: How survey respondents learned of the DTI*

In interviews, the DTI staff (Emily Norton, Kathy Guo, and student Studio Design Partners) showed how they aim to make the space sustainable and community-oriented with the lowest possible barrier to entry. They have policies like tool checkout, no penalties for lost items, no fees for supplies, and not being snobby about what people create. Challenges arise when these values clash with each other and with the reality of spatial and monetary resources. An important example cited in interviews and surveys by both students and those who work at the DTI is the tight space. DTI staff have clever ways to work with the space available. They have incorporated tall shelves, use moveable furniture, and sacrifice some storage area for people space. Still, the space is not fully accessible, sometimes it's crowded and noisy, and it's currently utilized to its capacity.



*Figure [3]: An example of the DTI configured to maximize usable floor space via tall shelves*

In interviews, DTI staff mentioned how other makerspaces on campus could offset some of these difficulties. Many are fully accessible and have specialized equipment and high-demand supplies. Both students and DTI staff expressed a wish that students could use other makerspaces more often. Unfortunately, respondents are less likely to use other makerspaces at Smith than the DTI (see Figure [4]). In interviews, students mentioned confusion over whether they could access certain spaces. There is also a lack of awareness,

where students who would enjoy using certain spaces don't know they exist. For instance, one interviewee knew students who go to UMass for UX resources when Smith has a UX lab.

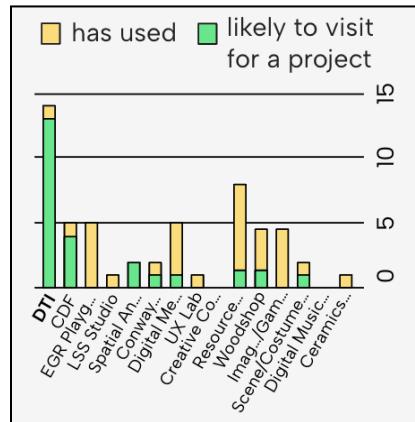


Figure [4]: Makerspaces survey respondents have used and are likely to visit

Our key problem, then, is that students don't have complete information about Smith makerspaces, prompting them to return to the one that is most familiar, the DTI. Most of the information is available on the Smith website, but it is hard to search for it. Because of the interdisciplinary nature of the makerspaces, the relevant information is scattered across department pages. Interestingly, this is not an information consolidation problem. The Smith Maker's Map consolidates all the information into an easy-to-read and searchable page, but suffers from the same obscurity the makerspaces themselves do. This is likely because you would need to search the Smith website to find it. So, the problem we need to solve is how to make makerspace information not just available, but discoverable.



Figure [5]: The Smith Maker's Map is an existing resource with helpful makerspace information

#### 4. Portfolio of Design Provocations

The Portfolio of Design Provocations presented here encompasses three distinct conceptual designs aimed at enhancing the accessibility, utilization, and community engagement within the makerspace ecosystem at Smith College.

**1. Maker's Challenge:** The Maker's Challenge is a dynamic event strategically targeted at first-year students during the fall semester. The primary objective is to foster student engagement, encourage collaboration among various campus organizations, and familiarize students with the available makerspaces before they have projects and deadlines.

The Challenge is structured around the utilization of the existing Maker's Map, leveraging its foundation while enhancing its visibility and functionality. By introducing students to the Maker's Map in a memorable way, the Challenge seeks to increase their base knowledge and familiarity with makerspaces.

The decision to modify the existing Maker's Map rather than creating a new platform reflects a commitment to building upon established student initiatives and maintaining makerspace autonomy. Furthermore, offering both an app as you can see in Fig.[6] and a paper format, Fig.[7] caters to diverse preferences and ensures maximum participation.

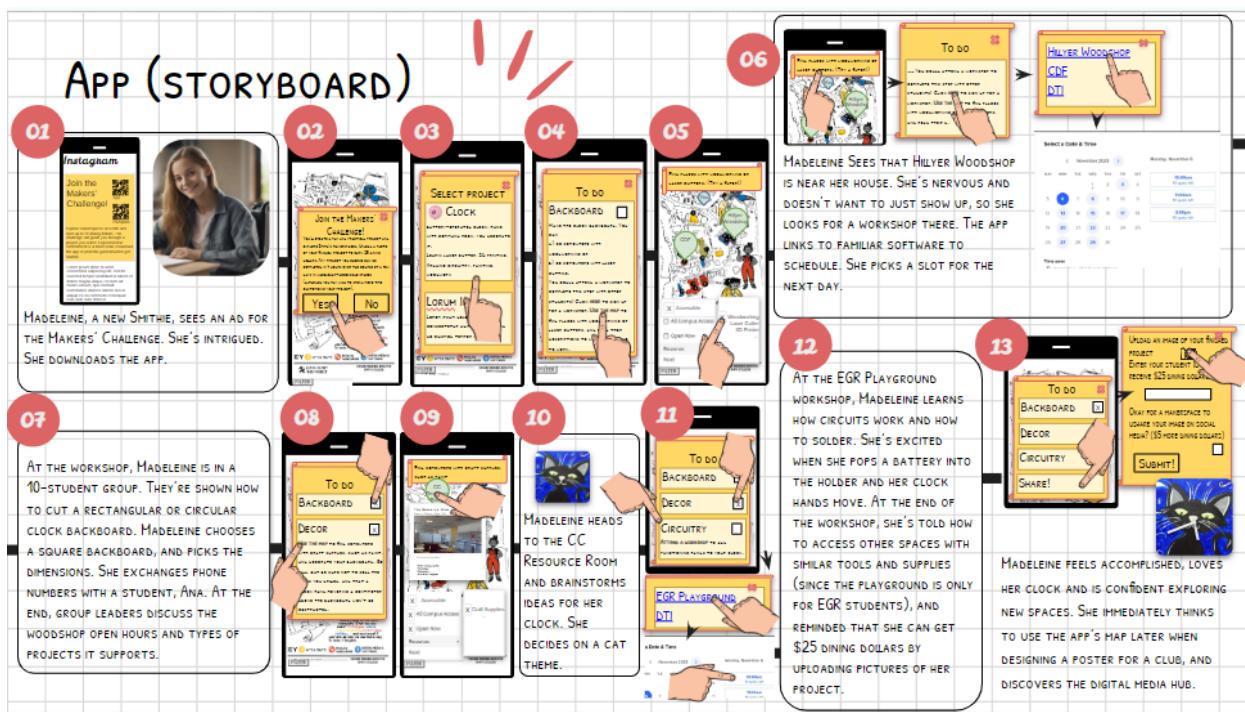


Figure [6]: App format of the Maker's Challenge

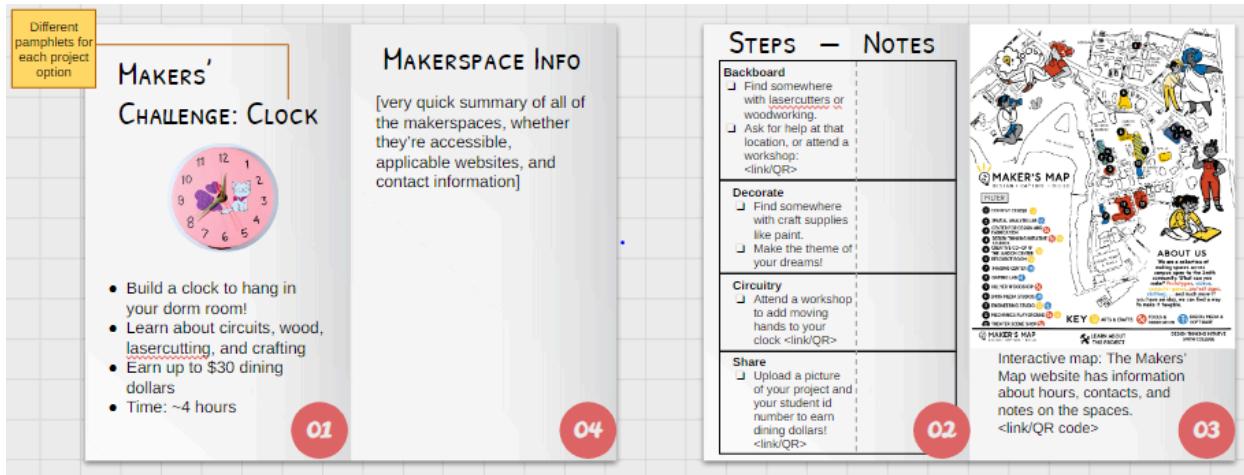


Figure [7]: Pamphlet format of Maker's Challenge

Timing-wise, launching the Challenge at the beginning of the fall semester capitalizes on the excitement and exploration mindset of first-year students, creating a sense of urgency and community involvement. Additionally, constraining the timeline facilitates larger participation and justifies the allocation of resources for workshops.

**2. The CC App (Campus Connect App):** The Campus Connect App is designed as a centralized platform for accessing campus resources, with a specific focus on makerspaces. Comprising a Community Hub and Makerspace Directory, the app aims to streamline navigation and foster collaboration among students.



Figure [8]: CC App: Community Hub wireframes

The Community Hub serves as a space for students to share projects and offer mutual assistance, thereby nurturing a sense of belonging and camaraderie within the maker

community. Meanwhile, the Makerspace Directory provides comprehensive information on available resources, facilitating seamless navigation and access to tutorials tailored to individual interests.

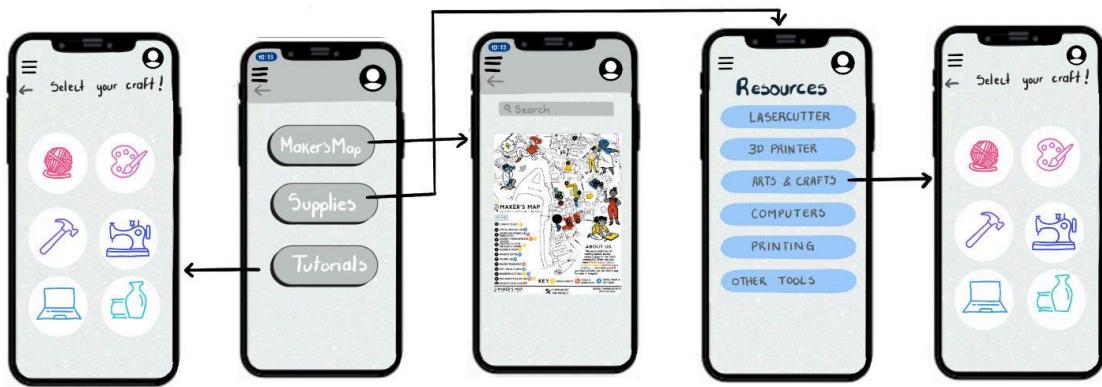


Figure [9]: CC App: Makerspace Directory wireframes

The potential expansion of the app to include additional college resources underscores its scalability and adaptability to evolving student needs.

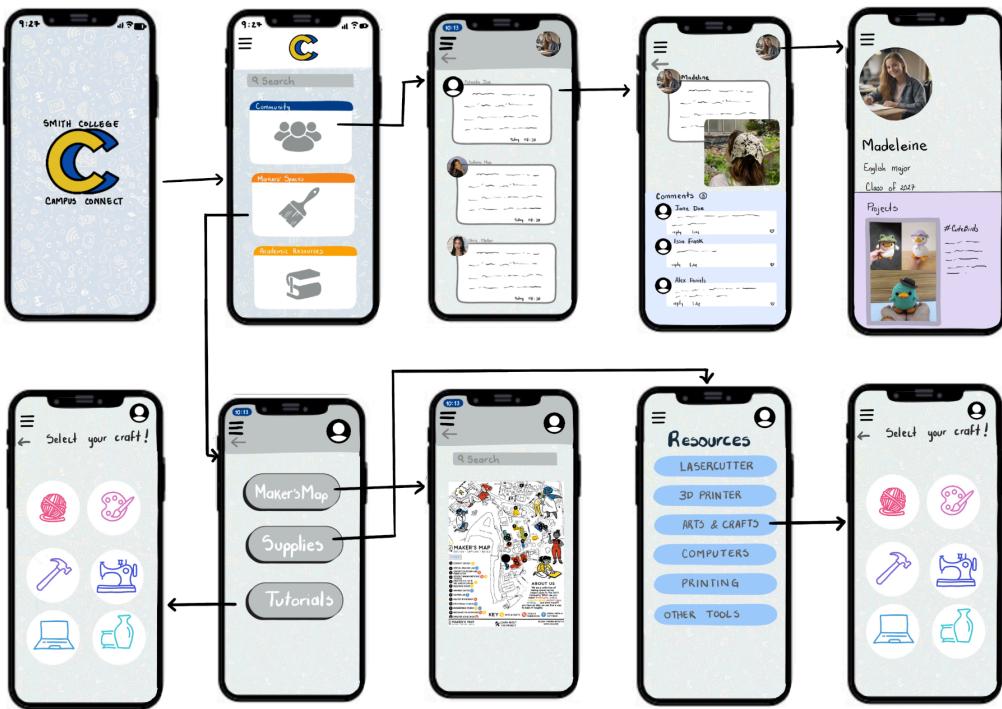


Figure [10]: Lo-fi prototype: Complete set of wireframes of the CC App

**3. MakerMate AI Chatbot:** The MakerMate chatbot harnesses the power of AI technology to provide personalized recommendations for Smith College students seeking assistance with

their projects. Accessible across various platforms including Discord, Moodle, Slack, and the official Smith website, MakerMate aims to bridge the gap between students and available resources.

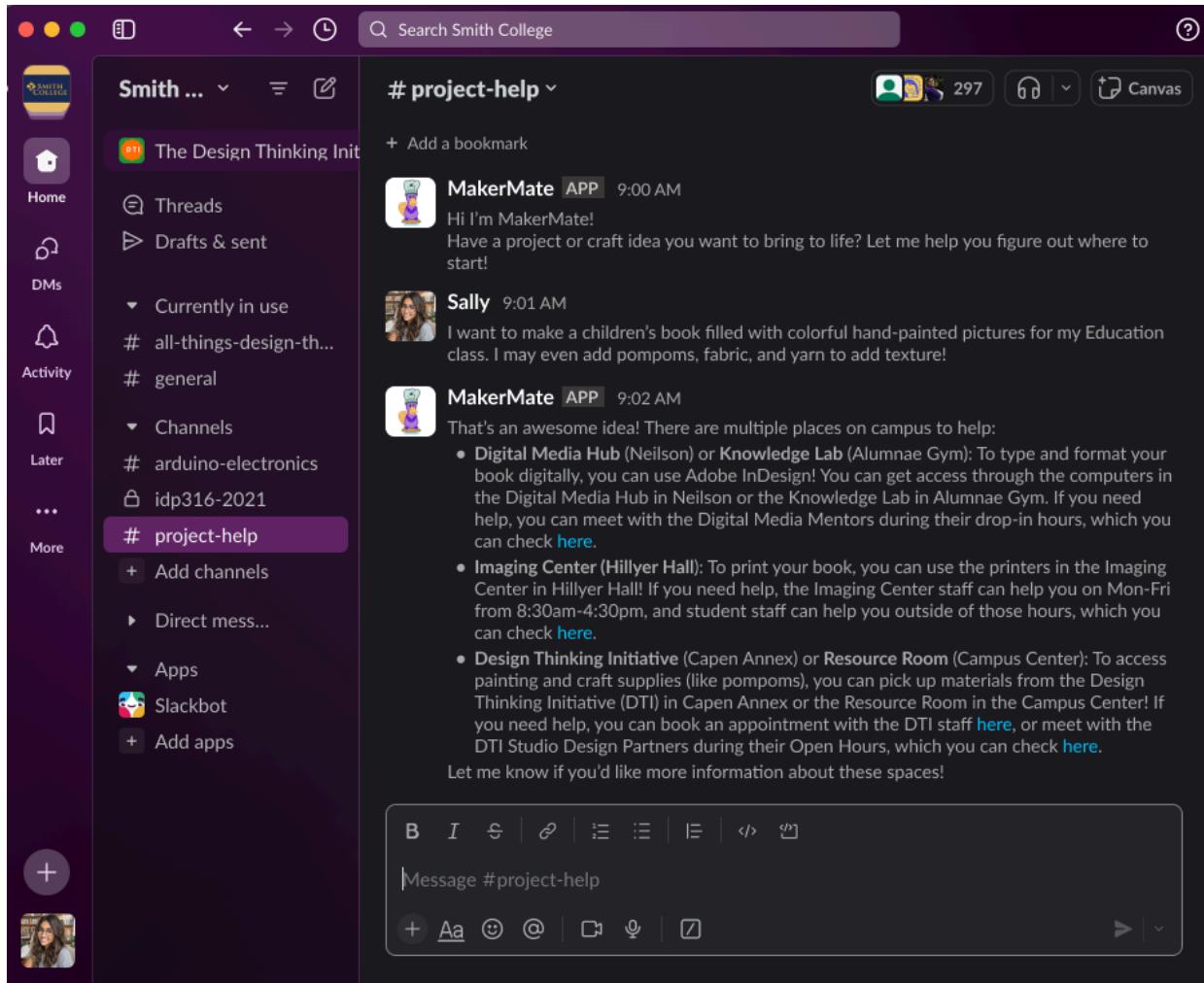
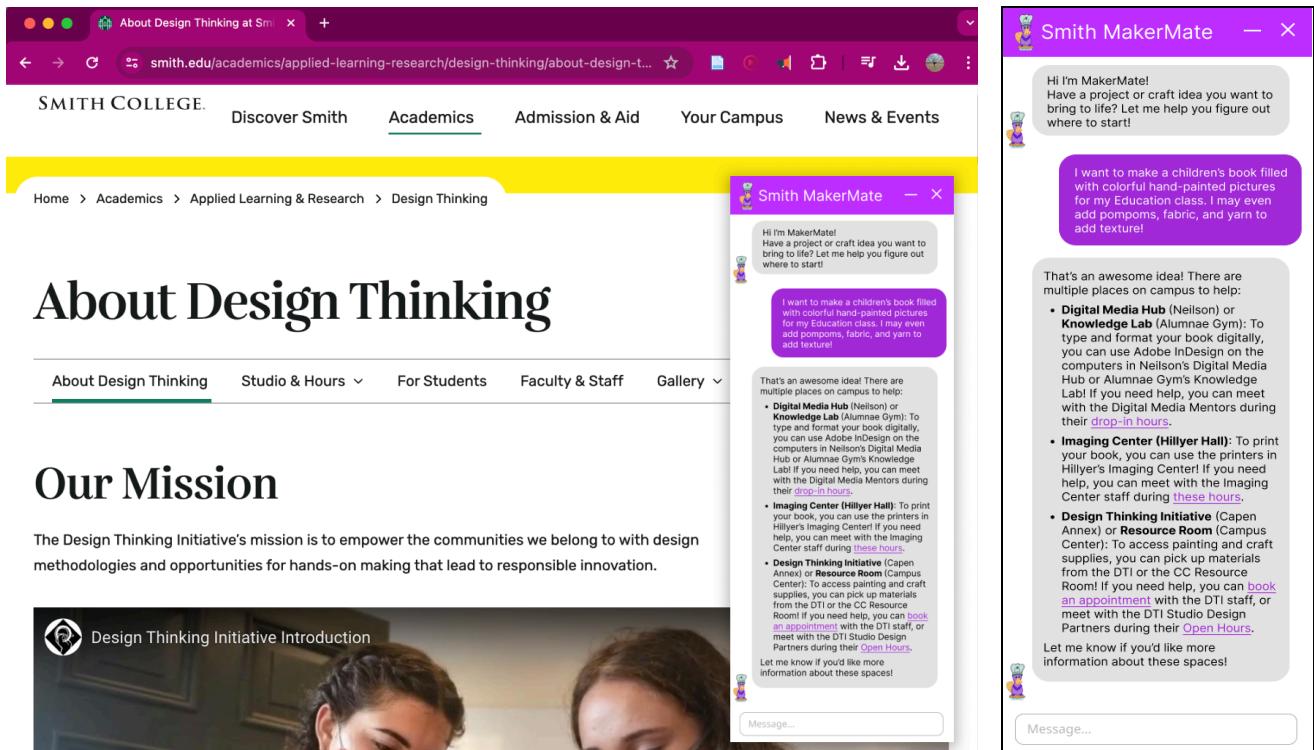


Figure [11]: MakerMate integrated into its own Slack Channel

Unlike traditional instructional aids, MakerMate does not seek to replace human assistance, but rather complements existing support structures by connecting students with relevant makerspaces and resources. By offering personalized suggestions tailored to individual project requirements, MakerMate enhances accessibility and facilitates informed decision-making.

The widespread availability and familiar interface of MakerMate ensure its discoverability and usability among students, thereby addressing the prevalent issue of resource underutilization due to lack of awareness.



*Figure [12]: MakerMate window inserted in DTI section of Smith College website*

In summary, the Portfolio of Design Provocations represents a concerted effort to optimize the utilization of makerspaces at Smith College through innovative approaches centered around community engagement, resource accessibility, and personalized assistance.

## 5. Prototype Interaction Walkthrough

Our final prototype builds on our MakerMate AI Chatbot design, but rebranded as "Platy." Like MakerMate, Platy is an AI-powered chatbot specialized in answering questions related to makerspaces at Smith. For example, if prompted with a project idea, Platy will respond with recommendations for relevant makerspaces and/or people who can provide the resources or assistance to make the project. Platy is also able to provide general information about the makerspaces, such as operation hours, who to contact for a particular space, who has access to the space, whether a space is wheelchair accessible, and links to related websites. However, Platy was specifically instructed to not provide detailed instructions on how to complete projects in order to encourage users to seek such instruction from the suggested human staff.

We built Platy using Voiceflow AI, a no-code tool for building AI agents. Our Voiceflow agent consists of two blocks: one block to welcome the user and capture their input, and another block to generate a response with AI. The Response AI block uses either the GPT-3.5 Turbo

model or Claude 3 Haiku model, and has the temperature parameter set to 0.70 and max tokens parameter set to 1000 tokens. Platy pulls its information from a document that we compiled detailing information about every Smith makerspace, including the location, operation hours, functionality, access eligibility, and who to ask for help. We gathered this information primarily from the Maker's Map, but supplemented it with information from the official websites of individual makerspaces as well as our own personal knowledge of the makerspaces.

Currently, Platy is available across multiple platforms, including the [Voiceflow prototype testing chat window](#), a website widget, and a Slack bot. The website widget can be embedded into any websites of our choice, and the Slack bot can be installed into any Slack workspaces of our choice; currently, the Slack bot is usable in a Slack workspace for a mock Education course. The Slack bot is connected to our Voiceflow agent using an [open source API on Replit](#) written by Nicolas Arcay Bermejo, a Product Advocate at Voiceflow. At the moment, the Slack bot can only operate when our version of the Replit is actively running, which it can only do for a limited period of time at once. To interact with Platy, a user may open any of these platforms and send a message containing a question or statement related to making or makerspaces. Platy will send back a message within a few seconds containing a relevant response.

Below is an example of a real interaction between a user and Platy:

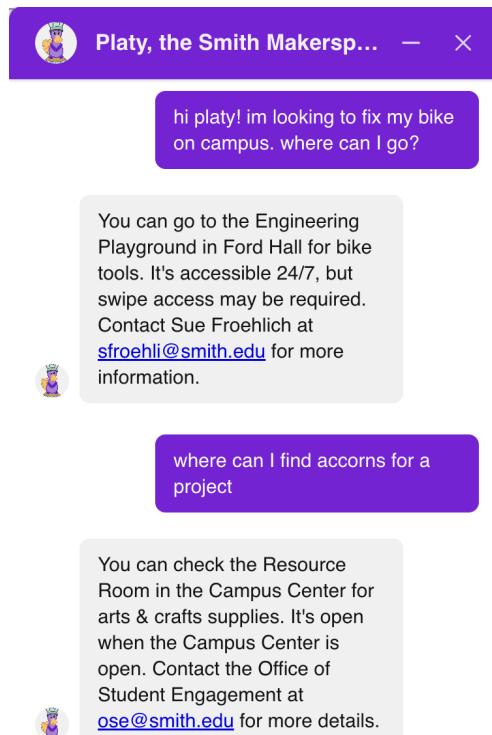


Figure [13]: A conversation between Platy and a user on CSC 256 Demo Day

## **6. Evaluation Method & Results**

We asked three students to chat with Platy in the Voiceflow prototype test window. To mimic the level of instruction they would get "in the wild," we did not provide further directions. We recorded their screen and reactions, and asked questions afterward. Chat transcripts from Demo Day gave further insights into how students may use Platy.

Platy impressed students, but they were still wary of generative AI. Our second participant said, "This is easier, although...I still would double fact check it." While Platy efficiently provides makerspace ideas, it adds a step to the search process because students verify the information afterward. In the future, Platy could streamline fact-checking by providing source links.

Sometimes participants thought they had to compensate for something Platy could already do. Our third participant double-checked their spelling, which isn't necessary to use Platy. Indicating this or adding a voice chat option could remove this perceived step.

Participants also uncovered some flaws in Platy's information base. Platy lacks related information that participants frequently asked for. For example, it cannot describe locations, and lacks information on makerspace-adjacent resources (e.g., botanic gardens). Platy sometimes mixes up concepts, like using a 3D printer vs borrowing one. Sometimes, Platy fails to answer questions about multi-step projects. For instance, Platy replied "Unable to find relevant answer" to "I want to build a couch where can i go to get it done?"

On Demo Day, participants asked Platy many silly questions loosely related to makerspaces. Platy deflected and provided helpful, generic responses. But, it is important to consider what the best response to this is. Platy is not intended to be an interface used for purely entertainment purposes. Participants should feel inspired about their projects after getting the right information and should stop chatting.

## **7. Conclusion**

In this work we presented Platy, an AI chatbot that provides Smithies the most relevant information available on existing but hard-to-find resources (Makers Map and Smith webpages) via familiar platforms (e.g. Slack) to encourage exploration of lesser-known campus makerspaces as a solution to uneven usage of Smith College makerspaces.

In the future, we can enhance Platy by making its output more relevant, integrating it into existing platforms, and broadening its scope. We can achieve this by consistently providing links to aid students in fact-checking, integrating Platy into common Smith platforms like Moodle and Discord, and expanding its information base to include resources from makerspace-related academic departments and organizations, and geographical data about makerspace locations. Currently, Platy's data document has more information on certain makerspaces than others, so we could gather more information and collaborate with the

makerspaces we have less information on to ensure that those makerspaces are properly represented in our data.

Our work highlights the necessity of designing for resource discoverability and adoption. Additionally, we envision Platy as an example of an AI chatbot that maximizes utility while minimizing harm. In communities like the makerspaces with established ways of doing things, it is most effective and respectful for designs to complement, not replace, existing resources and people. Platy lives in a context where hallucinations have smaller consequences, and one in which the existing complex information structures are both insufficient and difficult to redesign. In this context, Platy can enhance resource discoverability and empower students to effectively explore and utilize makerspaces without disrupting core community dynamics. We believe Platy has the potential to overcome common barriers to adoption and contribute positively to the student experience at Smith College.

## **8. References**

Design Thinking Initiative Smith College. (2022, July). Smith Makers Map.  
<https://smithmakersmaps.com/>

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