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DESIGNY: A MULTIMEDIA PLATFORM FOR SUPPORTING STUDENT PROTOTYPING IN PRODUCT DESIGN EDUCATION

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ABSTRACT

In product design courses, prototyping offers a way for students to develop physical intuition about materials while practicing techniques used by professional designers. A web-based platform was developed to explore the use of multimedia to provide students with additional support for prototyping activities. The result is Designy (www.productdesigny.com), a platform containing a series of photo- and video-based resources meant to help students prototype effectively. Students in two product design classes – 2.00b Toy Product Design and 2.744 Product Design – were given access to Designy to aid in their project work. To better understand whether the platform was utilized by students and if access to the platform contributed to student learning and project work, researchers analyzed website activity data and interviewed students (n=19) to collect data regarding their experiences with the platform. A core group of 24 students (27%) in 2.00b and 29 students (35%) in 2.744 generated the most activity on the platform. Interview data indicates that students used the platform to answer prototyping-related questions when designing, to better understand the landscape of prototyping tools available to them, and to increase a feeling of confidence working in a prototyping shop.

Overall, results suggest that while in-person interactions with staff members can better help students in situations where the support students need is poorly identified, Designy was shown to provide efficient support in situations when students could clearly identify the type of support they needed.

INTRODUCTION

Mechanical Engineering programs at the university level are trending towards a larger central focus on design. Atman et al. states "For engineers, designing integrates engineering knowledge, skill, and vision in the pursuit of innovations to solve problems and enable modern life" [1]. Within a mechanical engineering program, product design allows students the chance to integrate technical knowledge with an understanding of user needs to develop products that can solve real problems. At MIT, product design courses are based on creating environments that resemble authentic professional design practice while providing students with additional support so they can learn while practicing professional design work.

These product design courses utilize project-based learning that incorporates teamwork, gives students an opportunity to apply engineering science knowledge, and heavily involves physical prototyping activities. In professional practice, physical prototyping offers the ability to answer key questions as part of a design process [2]. For students, learning to prototype as part of designing is a core skill needed for the types of problem solving necessary to develop products. Physical prototyping also offers a way to build practical knowledge related to materials and manufacturing in a way that can help students build physical intuition that can reinforce other coursework.

In product design courses at MIT, support for student prototyping comes from a variety of channels. Lab instructors guide students through a design process while technical staff utilize craft experience to help students think through design details and operate equipment. However, even with significant support already in place, observations made during teaching suggested that students have additional needs related to prototyping support that were still not being met by existing support structures. As part of an effort of continuous improvement, the researchers sought new ways of providing

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support for student prototyping through the use of a newly developed online multimedia platform called Designy. The homepage of the platform is shown in Figure 1.

An online multimedia solution was chosen because the affordances provided by such a platform seemed to align with unmet student needs. Students would be able to access high quality multimedia in the form of images and videos that could provide them with detailed instruction they can access at their convenience. Figure 2 shows an example multimedia resource page designed to help students use a bandsaw, a common tool used in prototype fabrication.

Additionally, online coverage of prototyping content could meet the needs of a variety of student teams, each of which may have independent needs for information regarding different prototyping techniques, without adding to an already crowded course syllabus. Creation of custom multimedia resources also allows instructors to have control over the quality and content of resources in a way that can connect to or supplement existing online resources. Figure 3 shows an example multimedia page for a Shaper Origin, a new handheld CNC router. This page connects to existing resources provided by the Shaper company while supplementing those resources with media designed for students learning product design prototyping. Generally speaking, having multimedia instruction online provides broader access to prototyping information while allowing students to choose to review content that they consider relevant.
In order to better understand if students utilized the Designy platform and how it might be used as part of their design process, online activity was recorded and students were interviewed to collect their experiences. This paper begins with a discussion of related work, followed by a description of the development and implementation of the Designy platform. A description of the research study centered on collecting usage data from deployment of the Designy platform in two different product design courses – 2.00b Toy Product Design, a freshman introduction to product design and engineering, and 2.744 Product Design, a graduate-level product design course – follows.

RELATED WORK

Improvements in communication technology and video-sharing websites have led to extensive coverage of topics through the dissemination of tutorials related to prototyping. Websites like YouTube and Instructibles provide user-generated content to a broad population for free. Instructibles has started offering more professionally produced content through the form of Instructibles classes [3]. Sometimes these tutorials are utilized in classroom settings, while in other situations students may seek out supplemental information on their own to support their project work. However, there can be difficulties with integrating existing online materials into student coursework. The quality and accuracy of user-generated content online cannot be guaranteed, leading to some situations where information found online can end up sending students off track. Even if existing online content is high quality, students may have trouble finding it or may not be motivated to look for it. In certain situations, instructor-generated multimedia content will be the most appropriate content to properly support student learning.

In research contexts, examples of studies exploring online multimedia in design education contexts are limited. Use of multimedia to support student learning tends to focus on computer-based design topics like CAD [4] and engineering graphics [5]. One study explored the use of multimedia to provide instruction for CAD in a flipped classroom setting where students watched instructional videos as homework and then practiced CAD in class under the guidance of the course instructor and teaching assistants [6]. Flipped classroom studies tend to focus on rearranging time to facilitate more team problem solving activities instead of additional prototyping instruction [7] [8]. When studying technology use in design classroom settings, some studies focus on online technology to support distributed teamwork [9] or improved design report documentation through wikis [10]. For prototyping, there are examples of online multimedia technology used to support prototyping at a time before the term flipped classroom was popularized [11] [12], but more contemporary examples are harder to find. One example is an online tool to support physical prototyping in classroom settings through providing online tools for documentation, reflection, and sharing [13].

A gap exists in current research regarding multimedia instruction for supporting prototyping in design engineering contexts. This gap could exist for several reasons. Supporting
prototyping activity in university courses requires significant investments in terms of time, money, and infrastructure, making it difficult to include prototyping as part of student projects. In addition, the development of multimedia resources requires similar investments due to the need to acquire equipment, set aside time to learn necessary skills for development, and for the creation of content. The research presented here represents an effort to overcome these challenges in order to better support student prototyping.

BACKGROUND

Classes and Context

Designy is intended for use in the specific context of product design courses at MIT. While use outside of MIT is being explored and future work will consider Designy in other contexts, the platform was designed using feedback collected from students in the context of MIT product design courses. In order to understand the design choices made in creating the platform and the evaluation of the platform in course settings, a better understanding of the courses Designy was evaluated in is needed.

2.00b Toy Product Design is a class with a main goal of introducing freshman students to engineering design processes. The course tasks students with generating ideas for a new toy product and creating a realistic toy product prototype after a series of rounds of ideation, concept selection, and testing with physical prototypes [14]. The student population is generally interested in mechanical engineering but most students have not yet decided their major and are investigating mechanical engineering as a possible choice. 2.00b runs with extensive support from a staff pool of instructors, teaching assistants, and volunteers totaling around 50 staff members. Each lab session, which has students work on teams of 5 or 6 to develop a prototype for a new toy product, is supervised by a lab instructor that is usually either a practicing designer in industry or a graduate student studying mechanical engineering. Development of a toy product prototype typically requires the integration of knowledge of several fabrication techniques including woodworking, rapid prototyping, digital fabrication, and product finishing. Many toy products also integrate electronics prototyping. An example toy product prototype is shown in Figure 4. Incoming students have highly varying degrees of incoming experience with prototyping, with some students having prototyped before in high school programs such as First Robotics. Others will enter the class with no experience at all. Prototyping instruction in 2.00b comes from several class and lab activities devoted to practicing prototyping skills. Students also receive support from staff members through direct supervision during lab times.

Figure 4: Magnitude X, a game which challenges players to build towers on a shaking platform.

2.744 Product Design is a graduate level product design class with the goal of introducing concepts from user-centered design and industrial design to students studying mechanical engineering and business [15]. The class focuses on designing the experience around using products. Recent projects in the course have focused on designing “escape room” experiences, which are entertainment venues where groups of people are charged with solving a series of puzzles using physical objects placed in a room. These experiences generally require several electro-mechanical props connected to a central computer that manages access to different parts of a room that become unlocked as puzzles are solved. Teams in 2.744 are tasked with designing components for an escape room experience and creating a physical prototype for one key puzzle. An example project is shown in Figure 5. Project work in 2.744 requires fabrication techniques similar to those in 2.00b, but instruction and supervision of students is limited in comparison. The staff pool in 2.744 is comprised of 1 instructor and 3 teaching assistants, leading to a heavy reliance on students managing their own work and reaching out for support when needed. Although many mechanical engineering graduate students have experience with physical prototyping, others coming from science or business backgrounds will not have had exposure to prototyping techniques in their prior coursework.

Figure 5: A 2.744 prototype puzzle where players press buttons to prevent the spreading of a computer virus.
2.00b and 2.744 cover related content in that they are both about product design, but the student experience in each course is very different. In 2.00b, students receive more explicit prototyping instruction and get support through supervised lab sessions, whereas students in 2.744 work mostly independently. Both of these classes complete project work in MIT’s Product Design Lab, or PDL. The PDL is a shop space set up to support the fabrication of product design prototypes in design classes. It contains basic woodworking equipment, hand tools, prototyping materials, hot wire tables for working with foams, a spray booth, and digital fabrication tools like 3D printers and a laser cutter. Students working in the PDL can be seen in Figure 6.

Figure 6: 2.00b students working in the Product Design Lab (PDL) under supervision of the staff members.

Because of both their similarities and their differences, testing Designy in both 2.00b and 2.744 creates an opportunity to study which types of students in which use contexts might benefit from the platform.

**Development of the Designy Platform**

The initial motivation for Designy came about from teaching observations made during interactions with students in product design courses with an emphasis on physical prototyping. In order to better understand student needs that were not being met, interviews were conducted with senior students coming out of MIT 2.009, Product Engineering Processes, a senior product design class which charges students with identifying a new product opportunity and creating an alpha prototype [16]. In 2.009 and other product design classes at MIT, multimedia and online technology are used extensively for community building, feedback dissemination, and documentation of student projects [17]. Utilizing high quality multimedia to provide additional support for prototyping activities is made possible by the existing media equipment purchased for supporting product design classes. Teaching staff were also already trained in media and web development.

During the initial development of Designy, data collected during student interviews was used to outline a series of use cases that describe situations in which the platform might be used by students to better support their prototyping work. These “Intended Use Cases” (IUCs) were then used to develop the platform. Later, the IUCs were used to provide the basis for characterizing use cases cited by students. The IUCs that describe ways the platform was intended to be used are show in Table 1.

**Table 1: Intended Use Cases used to develop Designy.**

| IUC      | Student Problem                                                                 | Potential Solution                                                                 |
|----------|---------------------------------------------------------------------------------|------------------------------------------------------------------------------------|
| Planning | Students may not have key pieces of information needed to design prototypes to be fabricated with tools and techniques available to them. | Present information about fabrication options and design guidelines for students to use when planning prototype execution. |
| Preparing| Students may feel uncomfortable prototyping due to feelings of unfamiliarity or intimidation of the equipment or staff. | Provide students with resources they can use before coming to work in a shop space to help them gain confidence. |
| Exploring| Students are curious about tools and techniques available to them, but do not have documentation they can use to understand resources. | Provide students with comprehensive documentation of the tools and resources for them to explore out of curiosity. |
| Executing| Students find it hard to remember and operationalize what they learn in live prototyping demonstrations and activities. | Provide students with references to follow while executing prototypes. |

Use of the platform when Planning describes situations in which students have a specific question about a fabrication tool or technique and need to answer that question to move forward with their designs. For instance, a student might ask when designing a part to be fabricated out of a particular material “can I cut this material in the shop space?” or “which tool should I use to cut this material?”. Designy was designed to be able to help students answer these questions.

While the planning use case describes student use of the platform while answering a specific question for a specific task, students might also be generally uncomfortable working in a shop space, regardless of the state of their design work. Designy is also intended to aid students in Preparing for work in a shop space by giving them a chance to learn about the specific tools they will be working with in the shop in hopes of increasing their confidence through familiarity with shop tools.

Students may also be curious about all of the tools and techniques available for them to utilize in a shop space. Without proper documentation it can be difficult for students to comprehensively understand the prototyping opportunities afforded by a shop space. Designy is meant to aid in Exploring the shop space by providing shop tool documentation in an easily parsable format.

Finally, certain resources on Designy are created in a way that allows students to directly follow along with tutorials that describe shop tool operation. These resources allow students to
use Designy while executing prototypes by using the website while in the shop space working on project work.

Implementation of the Designy Platform

Designy consists of content separated by sections of related resources. Table 2 shows the resources available during the Spring 2018 semester when Designy was tested in 2.00b and 2.744.

Table 2: List of multimedia resources available in Spring 2018.

| Tabletop Tools          | Handheld Tools          | 3D Printing | Sketch Modeling | Digital Fabrication |
|-------------------------|-------------------------|-------------|-----------------|---------------------|
| Bandsaw                 | Power Drill             | Overview    | Overview        | Digital Sheets Overview |
| Drill Press             | Impact Driver           | Up Plus 2   | Sheets          | Laser Cutter         |
| Disk Sander             | Jigsaw                  | Prusa       | Foams           | Vinyl Cutter         |
| Spindle Sander          | Hand Router             | Dimension   | Digital Fabrication Overview | Shaper |
| Combo Sander            | Dremel                  | Objet Alaris| Digital Fabrication | Carvey |
| Drill Mill              |                         |             |                  |                     |
| Miter Saw               |                         |             |                  |                     |

Students were given access to the website when they were first tasked with physical prototyping as part of their project work, around 5 weeks into the semester. Designy was shown to students in lectures and to staff members during staff meetings. Students could also use mobile devices to scan QR codes, as shown in Figure 7, placed on shop equipment that would take them to the associated Designy resource.

![Figure 7: QR codes can be scanned by mobile devices to go to the relevant Designy resource.](image)

Although significant effort was put into making the resources useful for students, students in project classes tend to have limited time to spend on project work due to having busy schedules. Therefore, even if a resource might be useful to a student, there are no guarantees that a student will utilize a learning resource. In order to better understand utilization of Designy by students, a research study was conducted to analyze use of Designy in the two different product design courses.

METHODS

Quantifying Activity

Use of Designy to support prototyping in 2.00b and 2.744 was studied during the Spring 2018 semester. Students could log on to the platform using unique usernames. Since usernames on Designy serve as unique identifiers, the platform was able to collect activity data that was used to quantify the activity of each individual user in both courses. The researchers were able to collect data that showed which pages were viewed by which students and staff members.

Collected activity data in the form of page visits were used to analyze whether or not students logged on to the platform. It also allows researchers to see which resources were potentially utilized by students. One major limitation in analyzing activity data is that visiting a webpage does not indicate whether or not that webpage contributed to the learning or project work of that student. For instance, a student may have logged on to Designy, visited a few pages out of curiosity, and then could log out without utilizing the platform for their coursework. In order to have a deeper understanding of the effect of adding the platform to design courses, additional research activities were necessary.

Characterizing Use

In order to better understand how students were using the Designy platform in 2.00b and 2.744, students from both courses were interviewed and asked to provide information regarding if Designy contributed to their learning and if so, what those contributions were. A total of 19 students participated in the interview sessions, with 9 students interviewed after completing 2.00b and 10 after completing 2.744. Discussions with these students allowed the interviewer to assess the level of prototyping experience the student entered the course with. Incoming experience was considered relative to their peers in a given course. Students who had worked on projects that utilized similar prototyping techniques they would need to complete the prototyping projects in 2.00b or 2.744 were labeled as having a high incoming experience level. Students were also asked about whether they used Designy in a way that contributed to their learning or not. Both students who exhibited activity on Designy and those who did not were interviewed in order to also understand the contexts in which students chose not to use Designy.

The IUCs used during the development of Designy were not mentioned to students during interview sessions. Instead, students were asked to recount how Designy was used during their project work. These notes were used to characterize use of Designy by matching use cases described by students with the IUCs to document “Realized Use Cases” (RUCs). An analysis of RUCs allowed the researchers to gain a deeper understanding of how Designy was used by students.
RESULTS AND DISCUSSION

Quantifying Activity

In 2.00b there was a total of 316 page visits, with activity coming from 49% of the 88 student population. Even though students in 2.744 received significantly less supervision during project work, there was a similar level of activity, with 367 page visits coming from 51% of the 82 students in the course. Figure 8 shows the activity of individual students in 2.00b ranked from highest to lowest, whereas Figure 9 shows the ranked activity of students in 2.744. Activity levels were assigned descriptors based on three bins: high (10 or more page visits), medium (from 3 to 10 page visits) and low (less than 3 page visits).

Figure 8: Ranked platform activity for students in 2.00b.

Figure 9: Ranked platform activity for students in 2.744.
Combining the populations of the high and medium user groups reveals that most of the activity on the platform came from a core group of 24 students (24%) in 2.00b and 29 students in 2.744 (35%). The size of the core group of students indicates that while the adoption of the Designy platform was not widespread, enough students exhibited activity to suggest that inclusion of the platform may be improving the course experience for a significant subset of students. In addition to student use, staff members also exhibited activity in each course. Figures 10 and 11 show staff activity in 2.00b and 2.744 respectively alongside student activity for comparison.

Staff activity in both courses was comparable to student activity. This result indicates that staff members are a target user to consider in future development of the platform, as certain resources could be designed for the purpose of training staff members for supporting student prototyping.

Activity tracking also allows for investigating the number of visits each page received which can provide insights into which resources students may consider more useful. Table 3 shows the breakdown of page visits by section of Designy. Resources in the sections 3D Printing and Digital Fabrication received the most page visits in both classes. Activity could be high in these sections because these are both areas of increased student interest and areas where instruction about these tools in not provided through class activity.

| Resource Category | 2.00b | 2.744 | Total |
|-------------------|-------|-------|-------|
| Benchtop Tools    | 16    | 26    | 42    |
| Handheld Tools    | 23    | 2     | 25    |
| Sketch Modeling   | 15    | 18    | 33    |
| Shop Tips         | 27    | 16    | 43    |
| 3D Printing       | 54    | 36    | 90    |
| Digital Fabrication| 46   | 71    | 117   |

Characterizing Use

Student activity on Designy does not mean that students utilized the platform in a way that contributed to their learning. Student interview data was used to further investigate how students used the Designy platform. Table 4 shows student use cases characterized as Realized Use Cases from discussions in the interview sessions.
Table 4: IUCs were used to characterize use cases cited by students during interviews to document Realized Use Cases (RUCs)

| Participant ID | Activity | Planning | Preparing | Exploring | Executing |
|---------------|----------|----------|-----------|-----------|-----------|
| 2.00b         |          |          |           |           |           |
| A             | high     |          |           |           |           |
| B             | high     |          |           |           |           |
| C             | high     |          |           |           |           |
| D             | high     |          |           |           |           |
| E             | medium   |          |           |           |           |
| F             | medium   |          |           |           |           |
| G             | medium   |          |           |           |           |
| H             | high     |          |           |           |           |
| I             | high     |          |           |           |           |
| Total Number of Students: | 9 | 4 | 4 | 8 |

Many of the students interviewed were high and medium activity users, but some low activity users were also interviewed in order to better understand why some students might not utilize the platform for support their prototyping work. Students with the participant IDs R and S were low activity users from 2.744. Users H and I had high activity on the platform, meaning that they had 10 or more page visits, but did not exhibit significant use. This means that while students H and I logged on to Designy and visited several pages, the interview discussion revealed that these students did not use Designy in a way that contributed to their learning or project work. These students signed on to the platform, clicked around to see what was on it, and then logged out without utilizing the content in any strategic way.

In 2.00b, the most cited RUC for students was Planning. Students in 2.00b used Designy in order to answer a specific question during design and planning of their prototypes. Students cited coming up with questions while designing and then visiting Designy to attempt to answer their questions related to fabricating their prototype in the PDL. A breakdown of which student interviewees cited Planning as an RUC as well as additional information about their utilization of Designy is provided in Table 5.

Table 5: Use cases characterized as Planning

| Planning: 9 students | participant ID | student used Designy to: |
|----------------------|----------------|--------------------------|
| 2.00b student        | A, B, C, D     | figure out the feasibility of an idea |
| 2.744 student        | G, H, I        | figure out how to break into fabrication steps |
|                      | J, K, L, M     | investigate or source materials |
|                      | N, O, P        | design CAD details and/or choose a 3D printer |

The Preparing and Exploring RUCs were cited less frequently by the students who were interviewed. Even though they were cited less, it is important not to overlook the appreciation of having access to the platform expressed by these students. For the students who cited Preparing RUCs, using Designy was a way to increase their confidence before working in the PDL, reducing the intimidation they felt associated working with shop tools. Students citing Exploring were curious...
about which tools they had access to in the PDL and appreciated the documentation provided. The Preparing and Exploring RUCs are further detailed in Tables 6 and 7.

Table 6: Use cases characterized as Preparing.

| Preparing: 4 students | 2.00b student | 2.744 student |
|-----------------------|---------------|---------------|
| participant ID | student used Designy to: |
| A | feel more or informed before shop work |
| J | review safe operation of tools |

Table 7: Use cases characterized as Exploring.

| Exploring: 4 students | 2.00b student | 2.744 student |
|-----------------------|---------------|---------------|
| participant ID | student used Designy to: |
| A | see what is possible, learn about all tools in the shop |

Finally, many 2.744 students cited Executing as a use case. This result makes sense when considering that 2.744 students used the PDL while generally unsupervised by teaching assistants or instructors. When 2.744 students had the need to use a tool and needed additional support, some would follow a Designy tutorial alongside using the tool. Students used Designy in this way as both a replacement and a supplement for training from teaching assistants, using the platform as training when staff members were not around or reviewing information on Designy that they may have forgotten from previous face-to-face training sessions. The Executing RUCs are further outlined in Table 8.

Table 8: Use cases characterized as Executing.

| Executing: 8 students | 2.00b student | 2.744 student |
|-----------------------|---------------|---------------|
| participant ID | student used Designy to: |
| A | use the vinyl cutter |
| F | use the laser cutter |
| G | perform finishing techniques |
| N | use the Shaper Origin |
| N | reduce the fear of breaking a tool |
| N | not have to wait to get help from a TA |

Interview sessions also allowed researchers to characterize incoming experience levels for the interviewees. The initial assumption of the researchers was that students with high levels of incoming experience would not extensively utilize Designy, whereas students with low incoming experience would. Table 9 shows the incoming experience level of each interviewed student alongside whether or not that student used the platform in a way that contributed to their project work.

Table 9: Interviews allowed researchers to characterize incoming experience levels relative to classmates.

| ID | Use Significance | Incoming Experience |
|----|------------------|---------------------|
| 2.00b A | yes | medium |
| B | yes | high |
| C | yes | low |
| D | yes | medium |
| E | yes | low |
| F | yes | low |
| G | no | low |

| 2.744 A | yes | low |
| B | yes | high |
| C | yes | low |
| D | yes | low |
| E | yes | high |
| F | yes | high |
| G | yes | high |
| H | yes | high |

Six students had high incoming experience but also exhibited significant use. Why would these students utilize Designy? Further investigation revealed that some experience with shop tools helped students self-identify situations where they would need further support, which they could get from Designy. For instance, some students cited that even though they had used a laser cutter before, they knew that there could be serious consequences to operating the machine incorrectly. In this case, having some experience with shop tools motivated the student to use Designy in order to make sure they operated shop tools correctly, even without the direct supervision of the teaching staff.

Some students with low incoming experience were also observed to not utilize the Designy platform. These students generally cited preferences for interacting with course staff face-to-face when in need of prototyping support. The preference for face-to-face interactions was related to multiple factors, including a desire to foster relationships with course staff members and a feeling that operating shop tools was a dangerous activity that required supervision. Another limitation of a multimedia platform cited by students was that in a face-to-face setting, student work-in-progress models can be used as discussion tools when talking to staff members.

Comparing Designy to In-person Support

Results from characterizing student use of Designy provides important insights as to the role of the platform as part of the learning environment of a product design course. Designy is
intended to provide supplemental support to students in a way that augments in-person support from staff members, not in a way that replaces it.

In certain situations, students cite preferences for face-to-face interactions with staff members. When discussing with staff members, students can show their work and ask for specific advice. More importantly, discussions between students and staff members can help students identify the support that students need. In situations where students are having trouble realizing what they need help with, or have misidentified the support they need, staff members can help put students back on track. In this way, staff members are better equipped to provide student support in ambiguous situations.

There are situations when staff members are not able to provide support to students. There are going to be times when students are working on project work and staff members are not available to directly provide support. In these cases, having access to an online platform allows students to receive support in situations where the alternative is no support at all. In other situations where students have correctly self-identified the support they need, they sometimes express preferences for being able to utilize an online platform for support instead of receiving support from staff members. In these situations, an online platform can efficiently provide support for students when the help they need is clearly identified.

CONCLUSIONS AND FUTURE WORK

Prototyping is a key part of project work in design classes because prototyping allows students to develop physical intuition while practicing professional design work. However, for students to have successful project outcomes, significant support needs to be provided to help students succeed. In product design courses at MIT, even when extensive staff support is provided, situations arise where students have additional needs for support that are not currently being met. The multimedia platform Designy offers a way to supplement staff support with high quality multimedia instruction and documentation.

When investigated in two different product design courses, platform activity was generated by a core group of 24 students in 2.00b Toy Product Design and 29 students in 2.744 Product Design. Although there was not widespread adoption in these courses, the group of high activity users suggests that students appreciated additional support. Students utilized Designy to assist in the designing and planning of prototyping activities, to increase comfort and confidence when working with shop tools, to better understand the landscape of tools and techniques afforded by the prototyping shop, and to follow along with tutorials to guide use of shop equipment in the absence of in-person staff support.

Use of Designy in 2.00b and 2.744 helps to shed light on what students prefer in-person support versus online support through multimedia resources. Designy is most helpful in situations where the support needed is clearly defined and correctly identified by the student. When students are having trouble identifying the support they need, in-person support is a better choice, as a staff member can help to both identify the support needed and provide that support.

The investigation presented here clearly identifies certain situations where students appreciate the additional support provided by the online platform. However, the effects of providing support through Designy on project outcomes still remains unclear. Do students progress farther in their project work when they have access to Designy? Will they utilize techniques that would otherwise be overlooked? Can they complete prototyping activities in less time or are their models of higher quality? Future work can help better understand how providing support through an online multimedia platform might improve project outcomes in student prototyping coursework.

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