

Board 58: Need-Based Scholarship Program: Who is Applying, Who is Successful, and Who is Not Applying?

Dr. Anastasia Marie Rynearson, Campbell University

Anastasia Rynearson is an Assistant Professor at Campbell University. She received a PhD from Purdue University in Engineering Education and a B.S. and M.Eng. in Mechanical Engineering at the Rochester Institute of Technology. Her teaching experience includes outreach activities at various age levels as well as a position as Assistant Professor in the Mechanical Engineering Department at Kanazawa Technical College and Future Faculty Fellow teaching First-Year Engineering at Purdue University. She focused on integrated STEM curriculum development as part of an NSF STEM+C grant as a Postdoctoral Research Assistant through INSPIRE in the School of Engineering Education at Purdue University. Her current research interests focus on early P-12 engineering education and identity development.

Dr. Michele Miller, Campbell University

Dr. Michele Miller is a Professor and Associate Dean at Campbell University. Prior to joining Campbell in 2017, she was a professor of mechanical engineering at Michigan Tech. She received undergraduate and graduate degrees in mechanical engineering from Duke and NC State, respectively. Her research interests include engineering education and precision manufacturing.

Dr. Jacqueline Burgher Gartner, Campbell University

Jacqueline Burgher Gartner is an Assistant Professor at Campbell University in the School of Engineering, which offers a broad BS in engineering with concentrations in chemical and mechanical engineering. Campbell University started the engineering program in 2016, and she is leading the design and implementation of the chemical engineering curriculum at Campbell's innovative, project based pedagogical approach. She has a PhD in chemical engineering from Washington State University, where she specialized in miniaturizing industrial systems for applications in the undergraduate engineering classroom.

Need-Based Scholarship Program: Who is applying, who is successful, and who is not applying?

Introduction

The design and development of student-focused programs can be approached like an engineering design project. The desired goals or outcomes are defined, metrics for completion are identified, and solutions for reaching those metrics are developed and tested to ensure success. Similarly, for any student-focused program, be it a class, extracurricular activity, workshop, or other project, the goals or outcomes can be defined, metrics for completion can be identified, and solutions for reaching these metrics through the student-focused program can be developed and tested. To aid in this endeavor, common engineering tools can be used to streamline the development, design, and evolution of these student-focused programs.

This project illustrates the adaptation of one engineering technique used in human-centered design, the creation of personas, to help in the design and evolution of a need-based scholarship program with professional development requirements.

Background

Campbell University's School of Engineering is able to offer students need-based scholarships through an NSF S-STEM grant. As part of this program, students are expected to take part in a variety of professional development activities including mentoring, industry tours, tutoring, and internship preparation assistance. These activities were chosen as they are noted in existing engineering literature as beneficial for students that fit many of the target demographics for this institution. This institution is located in a rural area with many first-generation college students in the engineering student population. The institution also accepts many students into the engineering program who may need an additional semester or two of preparatory mathematics before they are able to take part in the fundamentals of engineering course that is a first-year, first-semester course for students who are enrolled in mathematics course of pre-calculus or higher. These populations of students are likely to have low social capital or pre-existing networks in areas that would support their college experience [1]. The designers of the student-focused, need-based scholarship program have made assumptions about the students they intend to serve, but cannot be certain that the students they are intending to apply will be the students that apply. They also cannot be certain that the intended students are the ones who are successful in applying for the scholarship through the blinded review process.

To be more aware of the students that are applying and winning the scholarships provided through the grant, a technique commonly seen in human-centered engineering design was employed. This technique is the creation of personas [2, 3], examples of students who are likely to apply for, win, and be unsuccessful in their application for the grants provided through this program. As noted by Alan Cooper, "Our most effective tool is profoundly simple: *Develop a precise description of our user and what he wishes to accomplish.* [2, p. 123]" These personas offer specific student examples to focus on while continuing to design the supplemental program and to develop the next iteration of the scholarship application process.

Methodology

Personas are used in industry, generally by firms focused on human-centered design, to give developers a target client to keep in mind while designing a project. They are developed to create a specific, though not real, example of a user, client, or in this case, student. The personas are not real people but are developed from real potential users, clients, or students. Multiple personas per project are typically developed through an in-depth interview process that incorporates designers, stakeholders, and potential users or clients of the design [2, 3, 4]. These personas have in-depth details creating a fully three-dimensional person, including aspects like a name, marital status, occupation, hobbies, and enough additional information related to your context to be able to really understand the persona as a potential user of your end product. In some cases, generic photographs are even used to ensure the designers have the personas solidly in mind when they are considering the users of their product [2]. Personas are also useful in explaining the project to outside stakeholders and can help to focus in on a specific target group or to realize via the persona that you are actually targeting a different user or that this user would not be likely to use your end product [4, 3].

In this project, we did not conduct interviews but pulled the details for the personas from the scholarship applications. The applications included some demographic information and four short essay prompts. The essay prompts were:

- What have been your most significant challenges to achieving academic success? Comment on how you overcame those challenges.
- Give an example of how you made the most of an academic opportunity.
- What are the biggest challenges to completing your engineering degree at Campbell University?
- How would the CORE-ES scholarship and program help you to overcome those challenges?

The applications contained enough data to create personas for our project. We chose to develop one persona per area of interest, similar to the recommendations to develop at least one persona per user type or user role [3]. In this case, our final personas include one to represent students who are likely to apply for this scholarship program, one student who is likely to submit a successful application, and one student who is likely to submit an unsuccessful application. The final personas should not match any one student applicant but, if added into the pool of student applicants, should not feel out of place or one-dimensional.

After the scholarship selection took place, the research team began to analyze the applications. Similar to a general thematic analysis or grounded theory research project, memos regarding common themes were made as the applications were read [5]. Common themes were considered in the development of the personas. All students in the target groups did not have to be reflected in the persona created to act as a representative of that group, however no student should be in direct conflict with or a polar opposite of the chosen persona.

A primary researcher developed the initial personas. The research team, all of whom were on the scholarship review committee, reviewed the personas for fidelity and to add supporting details where needed. This process is often done as a collaboration between designers and stakeholders, where one group may develop the stakeholders but the full team will provide feedback to “create realistic and believable people. [4]”

Results

Student 1: Aiden Johnson, Applicant

Aiden is from North Carolina. He didn't attend a community college before coming to this university. His father graduated from college where he met Aiden's mother, though Aiden's mother didn't finish her degree. Aiden works for the department as a lab attendant, often working on his homework when he's not checking out tools, cleaning the lab, or making sure that students are working safely. This semester he's scheduled for seven hours per week. Aiden is a third year student and has been in the department since it began. He also is heavily involved in the ASME organization, taking on a leadership role this year as the treasurer. Time management and seeking a balance between curricular and extracurricular activities is the biggest challenge Aiden has faced. He feels like he has been getting much better as time goes on even though the coursework continues to get harder. Aiden is interested in this scholarship program as it will lessen the time he has to spend at work and applying for other scholarships and allow him to focus more on his classes. He would also appreciate some of the other components of the program, like the internship and career focus that could help him be on track to a great job after graduation and a successful engineering career.

Student 2: Alexander Smith, Successful Applicant

Alex was born and raised in North Carolina. Neither of his parents attended college. To save money, Alex attended a community college first, then came to the university to complete his degree. This is his first year at the university. He feels that he has found a home in the department but doesn't have the time to be as involved as he'd like due to outside commitments. He hopes to become more involved as time goes on. Alex has found that time management is his biggest challenge; he helps his family out on weekends and whenever possible. He also continues to work at the job he held before, working for a restaurant. Through the scholarship, Alex plans to cut back on hours at work and learn more about how to navigate the university. He also hopes to take advantage of the internship preparation to get an internship before he graduates.

Student 3: Erynn Jones, Unsuccessful Applicant

Erynn is from North Carolina. Both of her parents graduated college. She is a third year student with a focus on chemical engineering and works for the engineering department as a tutor. She enjoys working with other students and helping her classmates, both in classes and younger students taking the classes she has already taken. She came directly from high school to the university. Erynn is involved in the SWE student organization and attended the last national conference with the university's student group. Her biggest challenge at university has been transitioning to the heavier workload and more open time management that the university allows. She was surprised at how difficult the first semester was and how much more she had to work here compared to high school. She is interested in the scholarship program to help offset her financial burden. Not having to worry so much about money would help her to reduce overall stress and help her to focus better on her schoolwork.

Implications

The results from this paper have implications for the scholarship program at this university and for other researchers seeking to understand their populations more deeply.

For our program, there are a number of implications. We designed the program to support first generation, low-income students from a variety of pathways, but the personas (based on the application data) do not quite match the intended target demographic. Successful applicants were more likely to be local first generation students, one of the targeted groups, however students who began engineering at a level below pre-calculus were unlikely to apply for and receive the grant. One of the target groups was underprepared students, those students who started below pre-calculus, and these students were not generally seen in our applications and thus, our personas. Future activities and the next round of applications will be reconsidered in light of these findings to ensure that we are meeting our targets and catering to our population as a whole.

The authors cannot recommend taking our results wholesale and applying them in any other context. For other programs, the process of creating personas is the larger takeaway. We have created these personas from existing data, specifically applications for the scholarship program at our institution. These personas could be created before developing a program to create a representation of a student who might be involved in a program, service, or learning opportunity. Throughout the design and development process, various questions could be asked using the persona as one likely respondent, including but not limited to:

- What would help this student the most?
- How can you achieve the program's aims for this particular student?
- What barriers might this student face in successfully completing the program's goals?

These results can be compared to schools to compare and contrast with programs that are similar in nature or on their face dissimilar. Reading these personas and considering how they compare to students in another program, or how they might compare to targeted populations and how they could be modified to fit other populations, is one potential use of these specific results.

Overall, this paper illustrates one method for the design, development, and evolution of student-focused programs using a technique found in human-centered engineering design. The technique of creating personas can be adapted to any situation and any context. The examples given provide results based on the population and context of a scholarship program at one small, rural, liberal-arts-focused institution and should not be applied in broader contexts. The method for creating the personas and the use of personas in the design, development, and evolution of student-focused programs can be applied broadly across different contexts and target populations.

References

- [1] N. Lin, *Social Capital: A Theory of Social Structure and Action*, Cambridge, UK: Cambridge, 2004.
- [2] A. Cooper, *The Inmates are Running the Asylum: Why High-Tech Products Drive Us Crazy and How to Restore the Sanity*, Indianapolis IN: SAMS, 1999.
- [3] "Personas," *Open Design Kit*, 2017. [Online]. Available: <http://opendesignkit.org/methods/personas/>.

- [4] T. Adlin, H. Jamesen and T. Krebs, "Fake People and Sticky Notes: Fostering Communication for Human-Centered Software Design," Akamai Technologies, Inc., Seattle WA.
- [5] S. B. Merriam and R. S. Grenier, *Qualitative Reserach in Practice: Examples for Discussion and Analysis*, San Francisco: Jossey-Bass, 2019.