Board 80: Nontraditional Students in Engineering: Persona Development

Alanis Chew, Youngstown State University

Alanis Chew is a Master's student in Industrial and Systems Engineering at Youngstown State University. She completed her B.S. in Mathematics and B.S.B.A. in Business Economics from Youngstown State University.

Dr. Cory Brozina, Youngstown State University

Dr. Cory Brozina is an associate professor and the Director of First-Year Engineering at Youngstown State University. He completed his B.S. and M.S. in Industrial & Systems Engineering from Virginia Tech, and his PhD is in Engineering Education, also from Virginia Tech.

Nontraditional students in engineering: Persona development

Introduction

Over the past few decades, there has been a change in the general college population. What use to be a very "traditional" population, where students were coming straight from high school and were primarily focused on school full-time, is now quite rare. The stereotypical image of a college students is not in fact the reality anymore.

The National Center for Education Statistics has found that between 1995 to 2012, more than 70 percent of all undergraduates had at least one nontraditional characteristic [1]. Nontraditional students' experiences are rarely considered at the institutional level. On top of pursuing a college education, these students have to balance work and family. The main goal of this research is to understand how institutions can meet nontraditional students where they are and be supportive of their collegiate endeavors. The study is guided by the following research question: *what are the experiences of nontraditional students in engineering with university support systems?*

We utilized various data sources such as journal reflections, interviews, and participatory design to triangulate our research. Most recently, we conducted a participatory design session to create personas of nontraditional students in engineering with actual students who are living these lives. These personas can then be shared with various stakeholders in institutions build empathy and perspective.

Literature Review

How are nontraditional students defined?

There have been many ways academic has been defining nontraditional students. There really is no standardized definition of nontraditional student in the literature at this moment. The National Center for Education Statistics (NCES) has put forth their definition for nontraditional students, which is what this study used to consider nontraditional students. According to NCES, there are three main criteria to be a nontraditional student: 1) enrollment patterns, 2) financial and family status, and 3) high school graduation status [2]. Under the first criterion, enrollment patterns, nontraditional students will either have a delayed enrollment or part-time enrollment. Under the second criterion, financial and family status, nontraditional students will have financial independence, full-time employment while enrolled, dependents, or are single parents. With the third criterion, high school graduation status, nontraditional students are identified by whether or not they received a standard high school diploma. Altogether, these three criteria make up the seven characteristics that determine the level of "nontraditionalness" of the student. For example, if the student only exhibits one nontraditional characteristic, they would be considered minimally nontraditional. Two or three characteristics would place them as moderately nontraditional while four or more would classify them as highly nontraditional [2, 3].

Nontraditional students' experiences

Minichiello [4] has researched nontraditional students and the deficit thinking they experience. She conducted longitudinal researched and highlighted two students who were a part of an engineering transfer program and found that these students are apologetic about their circumstances and the fact that they are nontraditional. In some sense, the institutions they attended (the main campuses they transferred into) do not really acknowledge nor support their endeavors to attain an engineering degree. These students have to balance school with work and family. Most of these students work full-time in order to support their schooling and when faced with faculty members who do not seem to care about their circumstances, it is very discouraging and demoralizing.

In a traditionally male-dominate field (STEM), Prusko [5] noted that "nontraditional female students are an ever-increasing population who have the benefit of experience and perspective." She also noted that the lack of relevant support, guidance, and words of encouragement led to the dissonance between the students' career goals and personal values and that early mastery experiences had a lasting impact on the students' belief in their ability to be successful studying STEM [5].

While there are articles on nontraditional students in engineering, there is hardly any literature that delve specifically into support systems. This study intends to fill the gap in understanding of how nontraditional students in engineer utilize and value the university support/resources.

Methods

In order to better understand the experiences of nontraditional students in engineering, this study drafted data-driven personas. We wanted to understand their interactions with support systems and resources and so situated ourselves by utilizing several sources of data.

First, we had created a reflective data collection instrument where the journaling prompts would ask participants to recall interactions they have had with a particular resource within a period of time [2]. We then followed up with five of the journal reflection participants for in-depth interviews. Our participants primarily talked about their financial situation, what their family/work-life looks like, and how they are motivated to go back to school [1].

Most recently, we hosted a participatory design session where we welcomed seven students to help us create draft personas of nontraditional students. We had a workshop where we broke the participants into three groups and each group would work on a persona that has similar characteristics to them.

Once we had a list of participants, we looked at the nontraditional characteristics they possessed and grouped them according. We specifically created the draft personas with the characteristics

the groups would be able to relate to. For example, knowing we have participants who would only possess one nontraditional characteristic, financial independence, we made one persona with only the financial independence characteristic.

Faculty Interactions				
	Week 2	Week 3	Week 4	Week 5
ID 8	No	Yes	Yes	Yes
ID 20	Yes	Yes	Yes	Yes
ID 22	Yes	No	Yes	Yes
ID 31	No	No	No	No
ID 37		No	Yes	Yes
ID 46	Yes	Yes	Yes	Yes
ID 48	Yes	Yes	No	Yes
ID 50	Yes	No	Yes	No
ID 61	Yes	Yes	Yes	Yes
ID 77	Yes	Yes	Yes	Yes
ID 86	Yes	Yes	Yes	No

Advisor Interactions				
	Week 2	Week 3	Week 4	Week 5
ID 8	No	Yes	No	No
ID 20	No	Yes	No	No
ID 22	No	Yes	No	Yes
ID 31	Yes	Yes	No	No
ID 37		Yes	Yes	Yes
ID 46	Yes	No	No	No
ID 48	No	Yes	Yes	No
ID 50	No	Yes	No	No
ID 61	Yes	No	No	No
ID 77	No	Yes	No	Yes
ID 86	No	Yes	No	No

Student Support Involvement				
	Week 2	Week 3	Week 4	Week 5
ID 8	No	No	No	No
ID 20	Yes	Yes	No	Yes
ID 22	No	No	No	No
ID 31	No	No	No	No
ID 37		No	No	No
ID 46	No	No	No	No
ID 48	Yes	No	No	No
ID 50	No	No	No	No
ID 61	No	No	No	No
ID 77	No	No	No	No
ID 86	No	Yes	No	No

Classmate Interactions				
	Week 2	Week 3	Week 4	Week 5
ID 8	No	No	No	Yes
ID 20	Yes	Yes	Yes	Yes
ID 22	Yes	Yes	Yes	No
ID 31	No	Yes	No	Yes
ID 37		Yes	Yes	Yes
ID 46	Yes	Yes	Yes	Yes
ID 48	Yes	Yes	Yes	Yes
ID 50	No	No	No	No
ID 61	Yes	Yes	Yes	Yes
ID 77	Yes	Yes	Yes	Yes
ID 86	Yes	Yes	Yes	Yes

Friend/Peer Interactions				
	Week 2	Week 3	Week 4	Week 5
ID 8	Yes	Yes	No	No
ID 20	Yes	Yes	Yes	Yes
ID 22	Yes	Yes	Yes	Yes
ID 31	No	No	No	Yes
ID 37		No	No	No
ID 46	Yes	Yes	Yes	Yes
ID 48	Yes	Yes	Yes	Yes
ID 50	No	No	No	No
ID 61	No	Yes	Yes	No
ID 77	Yes	Yes	Yes	No
ID 86	Yes	No	Yes	Yes

Campus/Event Involvement				
	Week 2	Week 3	Week 4	Week 5
ID 8	Yes	Yes	No	No
ID 20	Yes	No	No	No
ID 22	Yes	No	No	No
ID 31	No	No	No	No
ID 37		No	No	No
ID 46	No	No	No	No
ID 48	Yes	Yes	No	No
ID 50	No	No	No	No
ID 61	No	Yes	Yes	No
ID 77	No	No	No	No
ID 86	No	No	No	No

Figure 1: Heat Map of Fall 2021 Journal Reflection Responses

We provided the basic information (name, picture, NTS characteristics) and asked the groups to fill in a description and identify the persona's needs, wants, and behaviors. We then had the groups present their findings and we all had a collaborative discussion.

Altogether, we were able to triangulate our research and gained a strong understanding of the nontraditional students' experiences and support they desired.

Participatory Design Participants and Data Collection

We invited undergraduate engineering students in our college to participate in the participatory design. We sent out an email with a link to a form that allowed the students to identify the nontraditional characteristics that possess. We selected students who had at least one nontraditional characteristic. There was a financial incentive to participate in the research.

Participant	# of NTS Characteristics	NTS Characteristics
1	3	Delayed enrollment, financial independence, full-time employment
2	2	Full-time employment, financial independence
3	1	Financial independence
4	4	Delayed enrollment, financial independence, dependents, single parent

5	1	Full-time employment
6	3	Delayed enrollment (12 years), financial independence, dependents
7	1	Financial independence

Table 1: Participatory Design Participant List with Their NTS Characteristics

Key Findings

With the help of the participatory design participants, we have three draft personas, Lucy May, Kate West, and Josh Tall.

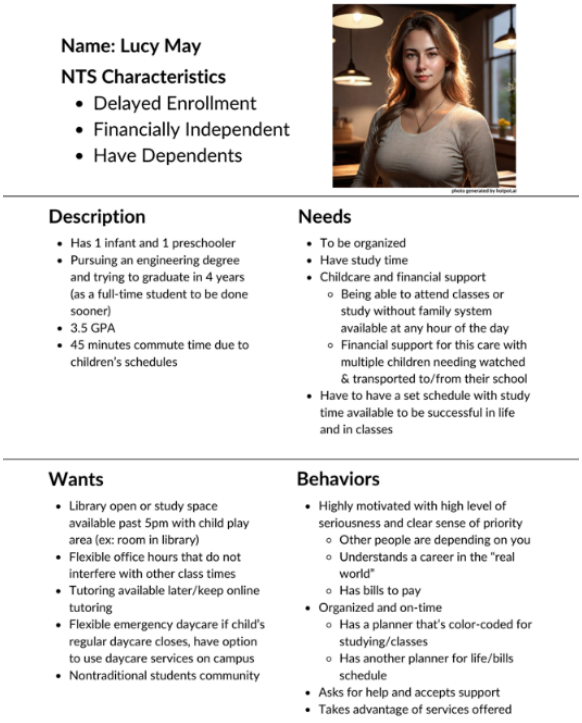

Figure 2: Draft Persona 1 Lucy May

Name: Kate West

NTS Characteristics

- Full-Time Job
- Financially Independent

Description

- Minimal family/friend support
- Want to graduating debt-free
- Hard-working
- Good time-management skills
- Consistently prioritizing responsibilities over wants
- Multitasking

Needs

- School support
- Emotional & mental support
- Professors who are willing to help
- Hybrid classes/online videos
- Time to take care of herself
- Decent amount of sleep
- Money (loans, grants, scholarships)

Wants

- More opportunities to meet fellow classmates
- More class options (at different times)
- More scholarship opportunities for nontraditional students
- Tutoring hours (MAC) to extend into the evenings
- Time for herself & time to breathe
- Nontraditional student community
  - Organization to meet other students

Behaviors

- Hoping to pass all her classes by doing work as much as possible
- Doing schoolwork during work, relax time, and all available free time
- Responsible
  - By limiting time with friends and fun activities
- She is rushed from going from class to meetings straight to work, then homework, then to sleep
- Organized
  - Make folders for all classes on computer to keep track of assignments, download videos and save previous exams, assignments, homework
  - Takes nice notes in class

Figure 3: Draft Persona 2 Kate West

Name: Josh Tall

NTS Characteristics

- Financial Independence

Description

- Recent high school graduate
- 1st year engineering student in college
- 18-19 years old
- Need to maintain financial stability
- Trying to gather friends in similar groups
- Finish in 4 years
- Maintain mental health & stability
  - Get involved in groups or activities to destress
- Part-time job on-campus

Needs

- Financial support and knowledge of aid
- Strong support systems personally & professionally
  - To help manage working and studying
- Good working relationship with faculty/classmates/campus groups
- Robust & adaptable school schedule

Wants

- Better scheduling options/flexibility for classes & work
- Financial support seminars & access to institutions that offer support
- Built-in co-ops/internships
- Resume building & professional development
- Better sense of understanding or empathy from faculty
- As many grants or scholarships as possible

Behaviors

- Going to office hours
- Building peer relationships
- Seeking out academic development support
- Attending career fairs/professional development
- Sits in the front of the class and is very attentive during/after class
- Is hardworking and always studying
- Is tired
- Building social community with peers (group chats)

Figure 4: Draft Persona 3 Josh Tall

Discussion

This discussion section primarily uses the journal reflection data because we are still working on analyzing the participatory design data. Firstly, it is important to understand who these nontraditional students in engineering are – most of them are financially independent and will work full-time or at least, part-time. They have many responsibilities, some have dependents, and everything comes down to time. We all only have 24 hours in a day and trying to fit all your responsibilities into the small timeframe is extremely challenging.

When prompted about their interactions with support resources (faculty, advisors, support centers, classmates, peers, and university events), many of them would respond with "I did not reach out or participate because I didn't have the time" or "I did not need help." If they came across a problem, they would either contact faculty or reach out to classmates for help. Again, because of their limited window of time to spend on campus, they have to be very strategic about what to do and how it relates to their goals of graduating.

Another interesting note about these students is their clear purpose and motivation. They know they are here to study and get their degree, which may be both good and bad. Good in the sense that they will only do what will propel them forward in their goals (to graduate), but bad because they may disregard softer opportunities such as events that may help them relieve some stress because they may not directly help them with their academic grade. Otherwise, they would rather spend their time with their families or at work.

Knowing all this, these students will only engage with the support resources if they help them with their goals. Most students will quickly reach out to the faculty when they come across a problem with their coursework or seek studying advice. Sometimes students find going to classmates directly more helpful because the faculty may not seem open to helping or the students feel talked down to.

Advisors are primarily needed for class scheduling, but some provide time-management or studying advice. One participant had a great interaction with the advisor about finding a job. On the opposite end, another participant discussed how the advisor "told me I should stack more classes to get done quicker," but "I don't think he [advisor] understands I work live by myself with other things I need to get done to be able to keep attending school and I also live 40 mins away so that adds up." As mentioned above, it is vital that the support resources are understanding and compassionate towards these students' circumstances.

The most positive and reoccurring theme was around classmates and having classmates to help support them. The main reason for them to reach out is because they need help with understanding the course material, homework, or feel less alone. "I just generally talk to the people around me to get a feel for how they feel about the classes, instructors and how they're

doing. I tend to get over-anxious at times, so hearing their feedback sometimes is a tool to let me know, 'Hey. I'm not alone.' " Partially, it's the chance to gain validation. "Everyone else was in the same boat as myself. It felt important to validate some of the inadequacy and imposter syndrome [feelings]."

Though it is not always clear how the participants define their peers, most of them referred to their classmates, but some would explain that they have no peers in the program, as they are older or have different obligations that the traditional aged college students would not understand. "I do not have any friends that I chat with about personal issues since I am nearly 20 years older than most of them," shared a participant.

As far as support centers, most of the participants do not utilize them. They either feel good about their progress or do not feel that they have the time to get additional support. "I didn't go to any help sessions because I feel like every time I go I just end up sitting around waiting for someone to help me in the MAC [Mathematics Achievement Center]. While they are extremely helpful when they do help I just feel like YouTube helps me more and I waste less time on it," shared a participant.

Similarly, these students do not usually attend university events. Primarily, they don't find them interesting. One student simply said, "I didn't do this [attend events] because I did not come across any events or activities that I wanted to attend. The events don't always align with my schedule, especially between work and school. It's hard for me to try and balance my time between them."

At the end of the day, we just want to emphasize the need to understand these students. One particularly heartbreaking quote: "I pretty much just gave up this semester because I ran out of money, had to put a dog down, got sick, fell behind and got depressed and lost hope." What else can we, as an institution, do to help these students feel understood, welcomed, and appreciated?

They don't necessarily need more events or interactions with the support resources available, but they want better quality interactions. We should promote better training to faculty and staff (the support systems/resources) across the university to let them know what this population of nontraditional students in engineering needs and wants and how they can support these students in the way that promotes acceptance and growth.

Limitations

Due to the complex and ever-evolving nature of the YSU's advising structure, students may have their faculty double as their academic advisor and some students may use the terms "faculty" and "advisor" interchangeably. Similarly, some students would refer to their classmates when asked about their relationships with their peers. As such, though we tried to tease out the responses

appropriately (code for specific support systems, i.e. advisor, faculty), we run into the potential for error. There may be relationships that have yet to be examined if students do have faculty who are their advisors and students who have their classmates as their peers.

Another limitation is that we coded all the responses together, instead of by question and time period. For example, we would have all the responses by participant 1 listed chronologically (responses for the 6 questions from first week, then second week, and so on). In doing so, we had an aggregated list of needs, wants, and behaviors, whereas we would have multiple lists of needs, wants, and behaviors according to each question or according to each time frame.

Future Research

In our recent participatory design session, in addition to getting help on the personas, we asked the participants to give us some feedback so that we can create scenarios that will add to the story we want to tell about nontraditional students. Once we finalize our personas and draft scenarios, we intend to send them to our participants to get their comments.

For others who may want to study this topic and try out the journal reflection instrument, it may be of interest to consider the relationships mentioned in the limitations above, how having faculty who double as advisors and also how having peers who are classmates affect the nontraditional students in engineering's experiences. From this study, whilst coding, a few students had brought up the fact that they do not have peers (within their age group) in college and how their classmates would not understand the challenges they go through.

Additionally, reviewing each set of responses by time period may offer other insights. If we could follow each participant to see how their responses have evolved over time or if they have stayed consistent, we may be able to learn more about their experiences.

Conclusion

Nontraditional students are a growing population in the university setting. As such, we should explore the various ways we can support them to achieve their goals. Specifically looking at nontraditional students in engineering, this study analyzed the interactions of these students with different support systems, faculty, advisor, support centers, classmates, peers, and on-campus activities/events. The study is built off several data sources: journal reflections, interviews, and participatory design. We developed three draft personas with the help of nontraditional students that shed some light on the needs, wants, and behaviors of nontraditional students in engineering. We found that the most important part to better supporting these students is understanding the challenges they face and offering better quality of support. We hope to share the personas with institutional stakeholders to build empathy and perspective for nontraditional students in engineering.

Acknowledgements

This material is based upon work supported by the National Science Foundation under grant number 2044347 within the IUSE program. Any opinions, findings, and conclusions or recommendations expressed in this material are those of the author(s) and do not necessarily reflect the views of the National Science Foundation.

References

[1] National Center for Education Statistics, “Demographic and Enrollment Characteristics of Nontraditional Undergraduates: 2011-12.” [Online]. Available: https://nces.ed.gov/pubs2015/2015025.pdf, 2015.

[2] National Center for Education Statistics, “Nontraditional Undergraduates / Definitions and Data.” [Online]. Available: https://nces.ed.gov/pubs/web/97578e.asp

[3] L. Horn, “Nontraditional Undergraduates: Trends in Enrollment from 1986 to 1992 and Persistence and Attainment Among 1989-1990 Beginning Postsecondary Students (NCES 97-578),” National Center for Educational Statistics, Washington, DC: U.S. Government Printing Office, 1996. [Online]. Available: https://nces.ed.gov/pubs/97578.pdf

[4] A. Minichiello, “From Deficit Thinking to Counter Storying: A Narrative Inquiry of Nontraditional Student Experience within Undergraduate Engineering Education,” International Journal of Education in Mathematics, Science and Technology, 6(3), pp. 266-284, 2018.

[5] P. T. Prusko, “Circling Back: A Portrait of the Lived Experiences of Nontraditional Female Students in STEM,” Journal of Ethnographic & Qualitative Research, 16(2), 2021.

[6] C. Brozina and A Johri, “Using Prompted Reflective Journaling to Understand Nontraditional Students in Engineering," Proc. 2022 ASEE Annual Conf. & Expo., August 2022.

[7] C. Brozina, A. Chew and A. Johri, "If I had more time: A transactional perspective on supporting nontraditional students in engineering," 2023 IEEE Frontiers in Education Conference (FIE), College Station, TX, USA, 2023, pp. 1-8, doi: 10.1109/FIE58773.2023.10343307.