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Professor Ravi Karkar
CS 325
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Team Red: Milestone 1

1. Problem Statement:

1a. Students have trouble tracking their graduation requirements and planning what classes to take. The team is trying to solve the issue of an outdated interface, messy presentation of graduation requirements when trying to figure out what is remaining, and the lack of centralization of graduation requirements and other course selection information used when picking classes.

1b. Ineffective course selection process needs solving because students can end up having extra semesters to graduate, which costs money and time. If the course selection process can have less intermediate steps and unnecessary confusion, students could potentially graduate earlier and get more out of their college education. Additionally, the issues with selecting courses need solving as it can prevent unnecessary stress and excessive time spent planning classes.

1c. The team wants to solve the problem of ineffective course selection as it distracts students from focusing on their classes and is more stressful than necessary. There is an overwhelming amount of spread out information and it is presented very unorganized to students. Every team member has experienced issues trying to keep track of their required classes. Some team members have changed majors, are pursuing degrees besides their primary major, or have certificates or minors they are pursuing, and have experienced frustration in trying to ensure they remain on track.

2. Literature Review:

There are various tools and resources that have been developed to help students and advisors in tracking student progress and graduation requirements outside of their college portals. Various institutions and their departments take on their own approaches to course selection: physical flow chart trackers, paying for softwares or tools, advisory, centralized pages with academic requirements, and more. Universities use various online tools to aid in the course selection process and help students stay on track for completing their degrees, whenever the resources are optimized or not.

One online resource that highschools and universities can use is Pathways. Pathways is a graduation tracking project that accesses local SIS programs to gather information about a student and list their graduation requirements. Information about Pathways can be found at https://educationadvanced.com/about. It also manages data such as GPAs, exam scores, and AP or IB credit. It is used for both colleges and high schools, but it is more institution facing than client facing, as academic institutions pay money to have access to Pathways as a tool.

Another similar platform is Degreeworks. It is a software accessible through collaborating universities, which enables students to view their degree progress online through a browser. Partnering universities have their own separate link leading to Degreeworks either through the university's website or portal, where students or advisors log in. For example, Appalachian State University links degree works on a page of their website. Degreeworks is not accessible for students outside of participating universities and has no stand-alone website. With Degreeworks, advisors and students are both able to access the student's information and degree progress. Additionally, they are able to effectively plan their future semesters and see all their degree requirements. Students get to immediately see required courses, current courses, future courses, unplanned or planned courses, and past courses and completed requirements. Students are also able to see the requirements of other majors and their hypothetical current progress through the new major with a click of a button. It is an institution-based software with a minimalistic modern design, but also has linked tutorials on how to use it.

The article "Automated Course Advising System," found in the *International Journal of Machine Learning and Computing* and at link, examines other advising and registration systems and delves into a developed software solution to course selection. The software created would ensure prerequisites are met when attempting to register – preventing students from being kicked out of a class automatically during an in-progress semester – and allow students to see their course options with ease. At United Arab Emirates University, advisory or prerequisites can be missed alongside academic standing issues, which can lead to expulsion from an enrolled course. As a result, this course scheduling software is developed to help prevent the removal of students that causes additional expensive semesters for them. The article walks through the interface and breaks down the process of using the software. The software requires manual input of the students information like their student id to access database information about the students previous and current courses to recommend future courses and course loads. There is also an option to input a preferred credit load and view the potential number of remaining semesters for the student to consider. All created semester plans are saved in a file for advisory approval and discussion with the student. Additionally, the software calculates the priority of courses, such as prerequisites for future required courses to take. Likewise, the software allows the student to choose when multiple courses satisfy requirements. The software's purpose is to aid in the process of selecting courses to then meet advisors, to ensure successful semesters and quicker degree completion.

Other than such software platforms, most universities have their own templates for their major requirements. For instance, Florida State University has a page on the university website to the academic program guide for all the programs offered. It provides information on every major and includes a clear list of required classes. This is a convenient page for people looking for centralized information on all majors. The website is well organized and easy to navigate. The only shortcoming is that it doesn't provide information on the FSU core courses, only the major related requirements. Adding core courses requirements would make the website complete as a central page for all academic graduation requirements. Another such example is the

graduation requirements/planning sheet for students at Fort Lewis College, linked on the university's website. They provide a concise list of general requirements, but the major requirements are blank. Students are expected to find the requirements and plan their classes accordingly. This system is well organized, but would be more effective if each department had their own version with the requirements for each major. An example of this would be University of Massachusetts Amherst's flow chart for computer science majors. This flowchart can be found online linked on UMass Amherst's website to download. It illustrates most of the computer science bachelors of science degree. The tracking form also includes an ordering with arrows, if any courses depend on a prerequisite. Still, it does not include all gen-ed requirements and students must check on SPIRE, their college portal.

Each solution has benefits and drawbacks. Online platforms can be beneficial for constantly changing detailed graduation plans and future semesters whereas university organizers can be a great place to find concise information on requirements. Leveraging the benefits of both by creating an online platform personalized to UMass Amherst by using college provided requirement tracking would be the best solution. The drawbacks of each solution will be considered and included to create a solution that is as effective as possible in making course selection streamlined.

Citations:

1) Pathways: https://educationadvanced.com/about
2) Degreeworks at Appalachian State University: https://registrar.appstate.edu/degreeworks
3) "Automated Course Advising System" from the *International Journal of Machine Learning and Computing*: https://www.ijml.org/papers/384-H0018.pdf
4) Florida State University Academic Program Guide: https://academic-guide.fsu.edu/z-list
5) Fort Lewis College Degree Tracking Worksheet: https://catalog.fortlewis.edu/mime/media/4/189/FortLewisDegreeTracking.pdf
6) UMass Amherst CS BS Requirements Tracking Form: cics.umass.edu/documents/computer-science-bs-requirements-tracking-form

3. Personas:

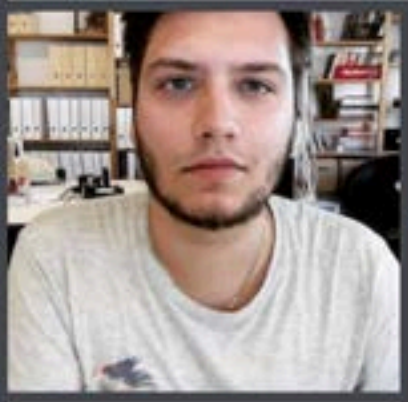
PERSONA: Anxious Andrew

NAME

Anxious Andrew

TYPE

Anxious



Goals

Pursuing an Undergraduate degree along with a minor in biology out of interest.

Feels confident he will graduate on time and has already planned out the rest of the classes he will take in University

Advising Tools

Primarily relies on SPIRE, Schedule Builder and meeting with advisors to plan out his classes for each semester.

Organizes his long term plans in a custom made excel

Demographic

♂ Male 20 years

Studio Art Major

3rd Year Undergraduate

Past Experiences

Transferred from a different college after completing multiple credits.

Has not had to retake any classes.

Bad experience with advisors not knowing his minor requirements and yelling at him.

Desired Features

- More information about classes on schedule builder
- Data about which classes fill up fast so alternatives can be planned for
- Have a way to filter for only classes that are required for the degrees being pursued
- Super clear checklist displaying full graduation requirements

Quote

The priority numbers when picking classes have definitely screwed me over a couple times. Classes I need to take to be on track for my major get filled up before I can even take them. There's not much you can do about it, obviously, but having to scramble to find a new class to fill the space of a class at full capacity sucks.

Likes

- Major specific check sheets
- Flowcharts showing future classes

Frustrations

- Ugly UI
- Confused by Enrollment Numbers

UXPRESSIA

This persona was built on uxpressia.com

The persona for Anxious Andrew was based on 10 of the survey responses the team gathered. The responses consisted of 9 Umass Amherst students and 1 Appalachain State Student, all who are pursuing a bachelor's degree at minimum. These survey responses were grouped together because they all reported having very stressful emotional experiences when selecting classes. This was quantified by reporting a 2 or below on the relevant question in the survey. Within this data, all participants reported feeling confident that they would graduate on time and that they had planned out classes beyond their next semester. The average answer for the question asking how confident respondents feel that they will graduate on time within this group was a 4.7, nearly at the value of 5, signifying extreme confidence. Furthermore, many of the responses reported frustrations with advisors or unexpected changes in their plans. Many responses also mentioned they were pursuing a degree or certificate beyond their major. This inspired Anxious Andrew as a person who feels extreme stress from trying to pursue a lot of requirements while not being able to plan out his schedule with 100% certainty. Also, the questionnaire responses contained some anecdotes which were given to Andrew in his frustrations and needs.

PERSONA: Olivia

NAME

Olivia

TYPE

Rational

Goals

- Graduate within 4 years with a Bachelor of Science degree in Computer Science
- Secure a job in her field immediately after graduation
- Graduate debt-free by maximizing the use of AP credits and financial planning

Quote

I want to make the most of my time in college--graduating on time and stepping into my career debt-free is my top priority.

Background

- Pursuing a 4 year Bachelor's degree in Computer Science
- Junior at the University of Massachusetts - Amherst

Demographic

Female 20 years

Amherst MA

Single

Student

Motivations

- Olivia is focused on graduating on time while minimizing her educational expenses
- She values academic efficiency and seeks to enhance her learning experience through AP credits
- Her goal is to secure a job in her field without incurring student debt
- She actively looks for ways to optimize her academic journey, such as engaging in internships and research opportunities

Frustrations

- Olivia feels overwhelmed by the pressure to maintain a high GPA while juggling extracurricular activities and part-time work
- She struggles with the lack of clear guidance on course requirements and and the path to timely graduation
- Olivia is anxious about making decisions that could potentially delay her graduation

She finds it challenging to balance her academic goals with her desire for a well-rounded college experience

- After taking an unnecessary class her freshman year, she's anxious about potentially falling behind

UXPRESSIA

This persona was built in uxpressia.com

On-Track Olivia is a persona derived from the survey responses of 16 students, all from Umass Amherst, who reported positive experiences in selecting their classes. These students expressed a high level of confidence in their ability to graduate on time, with an average rating of 4.5 for this sentiment. Olivia embodies the qualities of a motivated student who effectively utilizes resources like the schedule builder to plan her course schedule. While some respondents found advisors helpful, the overall sentiment indicated mixed experiences, with many feeling uncertain about the support provided by academic advising. Despite her generally positive outlook, Olivia faces challenges common among her peers, such as difficulty enrolling in popular classes due to high demand and confusion surrounding course prerequisites. Additionally, there were calls for more accessible resources, like streamlined graduation checklists, to help students navigate their academic paths. These insights reflect Olivia's desire for clarity and support in her planning process, showing her approach to education while still acknowledging the stress that can accompany course selection.

4. Functionality

Andrew's Required Functionalities:

1. A section for advisors where advisors can educate themselves on graduation requirements and be prepared to help students like Andrew feel more comfortable and satisfied with their advisor meeting and the product of the meeting (i.e. the plan they discuss in the meeting). They can help students like Andrew catch up, and ensure their advice is accurate from a centralized source where Andrew can also see a similar source.
2. A platform that offers multiple courses that match the same course requirements in case the course the student wants is not available. This feature can avoid or limit negative feelings when their schedule does not go exactly as planned. It will take the stress out of unexpected change in plans. Additionally, Andrew can come prepared to his advisor with backup option courses and prepared to assert which requirements he has left to fulfill in his degree. Andrew will no longer be overwhelmed by the multiple pages of physical and online information to sort through ineffectively.
3. An easy to use platform with clear instructions (or tutorials) and uncomplicated features so students, especially freshman, would not be confused working with a new platform. Like one of the survey respondents said from the Andrew Persona pool, it should not confuse students with numerical or word codes.

Olivia's and Andrew's Common Required Functionalities:

1. Andrew and Olivia need a tracker that can act like a checklist to make sure they do not take classes that they do not need to take. The tracker should have an updated interface that feels familiar to other modern tools online to make it easier for them to get the hang of them. This will ensure these students use their time well and prevent confusion.

Olivia's Required Functionalities:

1. A feature that can maximize her learning at a pace of credits per semester the student feels comfortable with. For example, Oliva wants to maximize the courses she can do without paying for extra semesters and she sets her personal maximum credits per semester requirement to 19 credits. So this feature will find courses that meet multiple credit requirements and create a plan using that to ensure her credits per semester don't exceed 19 credits and she graduates in the least amount of time needed. This would be very helpful for her since she does not want to not spend money on extra semesters and wants to optimize her learning.

5. Participation

Julia: Found three sources for the literature review (Degreeworks, Umass Amherst CS BA Tracker, and article "Automated Course Advising System"). Wrote the sections about those sources in the literature review and edited the literature review for grammar. Added and edited questions to the google survey form. Added a few sentences to question 1. Sent out the google questionnaire survey to friends and interviewed a student from Appalachian State University for the questionnaire and an observational interview of Degreeworks in her course selection process). Data collected from the interview and the observational are found at: link). Collaborated with Aarushi to brainstorm features for each persona and create a functionality list explaining each feature and their purposes. Reorganized the structure of the functionality list to include overlap between the personas. Attended all group meetings, communicated with the team to keep everyone on the same page and ensure work was evenly distributed.

Aarushi: Found two sources for the literature review (FSU and Fort Lewis college tracker) and combined all sources into a formal essay. Reached out to classmates and friends and encouraged them to complete the field research survey. Created the Andrew persona poster and collaborated with Nico. Collaborated with Julia to brainstorm features for each persona and created a list explaining each feature and its purpose. Cleaned up and organized the doc for final submission. Attended group meetings and collaborated with the team to distribute the work.

Nico: Answered question 1, found 1 source for literature review (Pathways), created google form and sent it out to a mix of friends and strangers. Processed data for Andrew persona and created an initial draft of the poster and wrote a summary paragraph of the creation process. Collaborated with Aarushi on the Andrew Persona. Attended group meetings with the team to distribute work and discuss.

Kailas: I contributed by creating the persona poster for Olivia and writing a summary paragraph that explained her goals, motivations, and challenges based on the survey responses. I also proofread the final document for clarity and coherence. Additionally, I reached out to about 10 friends and family members to participate in the field research survey, helping to gather diverse data for our project.

Everyone:

- The team had scheduled meetings every week on Friday at 11 am.
- Every team member has looked and contributed to finding respondents for the survey questionnaire. The data is found below on the google spreadsheet below: https://docs.google.com/spreadsheets/d/1R7RU_TjMCf-H2wvM2W0Qm5jWLTg6pwg831o0v-YBSrI/edit?usp=sharing.