CSC 554: Human-Computer Interaction

Course Project Report

Compiled by: Pratik Abhyankar (paabhyan)

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1. Introduction

In this project we studied the Computer Science (CSC) Department's website, of North Carolina State University (NCSU), by utilizing the fundamental principles of Human-Computer Interaction. On applying various methods such as heuristic evaluation, affinity diagramming and task analysis etc. we have proposed a new design of the website which aims to provide better user experience and improved look & feel. We refer to the NCSU's CSC Website as "CSC website" or simply as "product" in the later sections of this report.

2. Background

2.1. About the product

The CSC website under study, as stated above, can be visited at https://www.csc.ncsu.edu/. This is the official CSC website of NCSU, and its primary purpose is to provide information about CSC department such as research, faculty, courses and news and contact credentials of the department and its officials.

2.2. Why we chose this product

We chose to conduct our project on the CSC website primarily because we are also among its users, being the current Computer Science students at NCSU. We also had access to the vast and diverse consumers of that website, such as future students, current students, faculty, parents of the students and corporate people. This helped us in getting measurably useful feedback from surveys and interviews for our study.

2.3. Context and Environment of Project

The project was initiated by conducting heuristic analysis by each of the team members individually. Together as a team, later, we conducted several interviews with different types of users. All interviews were 1-on-1 basis, strictly confidential and anonymous to maintain the integrity of data generated from their stories. Similarly, the survey conducted was also anonymous.

After applying various methods, which are described in the following sections of this report, we compiled all information and analyzed it to propose a new design of the website.

3. Methods Applied – How and Why

We started off by first examining the existing product (CSC website) to identify its pros & cons with respect to design and interface. For this, we used the Heuristic Evaluation Method.

Later, we gathered data from the users by interviewing them and interpreting their concerns about the website. To categorize and priorities all the issues reported, we performed affinity diagrams and ideated a plan to resolve them. All of these aspects together comprised of our Contextual Design method. This helped us hugely to understand perspectives of different types of users.

In the analysis phase, we conducted a public Survey of the website users to better understand what the current website lacks in design, features and user experience. We also performed Competitive Analysis and Task Analysis to compare our product with other CSC websites of different universities.

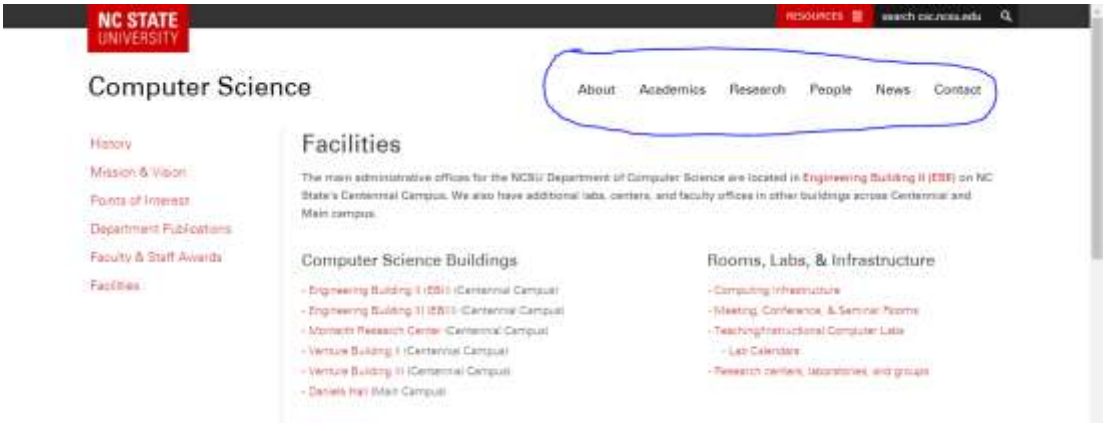
Finally, we proposed a new model of the CSC website, and created a wireframe prototype of it for demo purpose. This gave an insight into how the layout of new product will be structured and how quality content would be provided to the user with minimal efforts for the user. At the end, we also proved that the new design is better and more user friendly by re-evaluating it with a second Heuristic Analysis.

Each of these methods and their implementations are described in the following sections.

4. Heuristic Evaluation of Existing Product

Heuristic Evaluations were conducted individually by each of the team members wherein we assessed the Nelson's top 10 Basic Heuristics of HCI (link in the Appendix section), on our product. This evaluation was both, to find the pros as well as cons in the design. Following are 2 examples of Usability Aspect Reports, in which first describe a con and the second one describes a pro of the current CSC website.

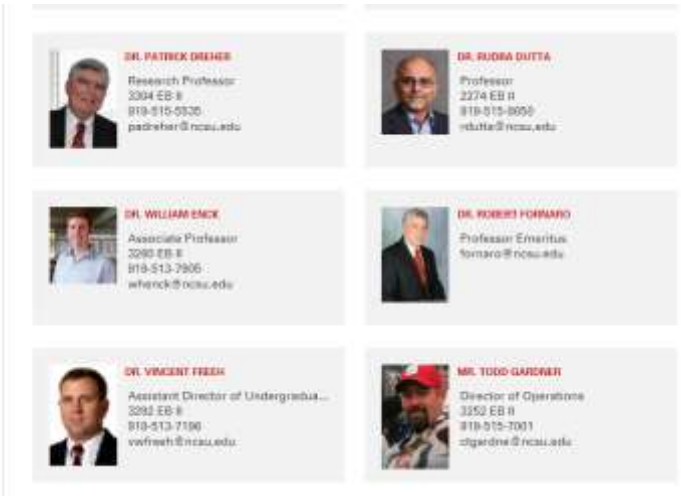
Personas for these Heuristic Evaluations can be any general user browsing the CSC website.

No. HE1	Problem/Good Aspect: Problem
Name: The navigation bar does not indicate which page the user is currently viewing.	
Evidence: **Heuristic:** Visibility of system status **Interface Aspect:** The main navigation bar of the website at the top, as circled in below picture. The problem is observed on all pages of the website. 	

Explanation: As circled with blue marker in the evident picture, the navigation bar does not highlight the current tab/page that the user is viewing. This violates HE1, where *Visibility of System Status* is not properly handled. Any user is very much likely to get confused. For example, a user may click the same page link again and land up on the same page as before.
Justification (Frequency, Impact, Persistence, Weights): Frequency: Common. This issue is observed on every page of the website Impact: Easy to overcome. The currently selected page/tab link can be highlighted by underlining it, using a simple CSS style tag. Persistence: One-time. Any user will be bothered by this issue on every single page of the website while navigating. But once the user understands that there is no navigation link highlighting, the user can overcome this hurdle easily by remembering the current page viewed. Weights: Although not highlighting the current tab can be an issue to any user, this is not a critical or major problem. Site's functionality, content or critical parts are not disrupted because of this. The user can probably remember the page/tab that he/she is on, while navigating the website and no damage is caused to either usability or readability of the website.
Possible solution and/or Trade-offs: A simple possible solution is to add a CSS style tag to highlight the current tab with an underline mark. There are no trade-offs for this evaluation.
Relationships: Not applicable for this.

No. HE8	Problem/Good Aspect: Good
Name: Information about every faculty is provided with minimalist design like a business card, on *People* page.	

Evidence:
Heuristic: Aesthetic and minimalist design
Interface Aspect: *All Faculty* tab on the *People* page of the website.



Explanation: Information about every single faculty is provided to the student persona in a very neat and concise manner. Only important credentials like Name, Photo, Email, Phone and Office location of every faculty member is shown on the page in 'cards' like boxes without cluttering the webpage. A student user can click on the name of a faculty to view more information like Research areas and Biography. This is delivers information and content to the user in an aesthetically pleasing and minimalist manner.

Justification (Frequency, Impact, Persistence, Weights):

Frequency: Common. This type of design is used for displaying information about all people in CSC Department on all the tabs on *People* page of the website.

Impact: The impact is critical and in a good way. Information like email and office location can be quickly retrieved, and detailed information, like Biography, which is rarely viewed can be accessed by clicking on the faculty name.

Persistence: Persistent. This is not an issue, but the design is persistent for all members on the *People* page of the website, which is a good thing.

Weights: The impact created by this type minimalist design is quite large and it delivers information to the user in a concise manner. According to me, this is a plus point of the design of this website which is consistent. There is also a match between the system and real-world, since each of boxes that display a faculty's credentials can be compared with a real-world 'business-card' of a person.

Possible solution and/or Trade-offs: There is no solution since this is not a problem.

Trade-off: If a user-type is an arbitrary visitor who wants to fetch detailed information about a particular faculty, then he/she might need to navigate through a couple of more links on the website than usual. However, this is a trivial trade-off and quite rare possibility.

Relationships: This is not related to any other UAR.

5. Contextual Design

Contextual Design is a customer-centered design process applicable to the product in order to make it more user friendly. In this method, complex customer data is gathered by interviewing them, which allows the stakeholders to prioritize their product design goals. Following are its stages which we applied to our CSC website to understand what its users most prominently want and how we can change the product to better suit their requirements. Link to detailed Contextual Design and Affinity diagrams is in the Appendix section.

5.1. Interviews and Observations

In this stage, we conducted 1-to-1 interviews with one interviewer and another interviewee. We then asked the users about their background, purpose of visiting the website, and if they found all the information they were looking for on it. We took Notes of these user stories required for next stages.

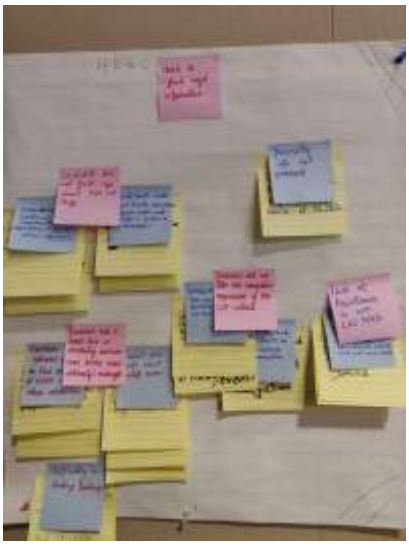
5.2. Interpretations

Within 24 hours of the interviews, we consolidated all the information from different interviews and created models and sequences from them. An interpretation of the interviews was necessary to understand user point of view which were then discussed in the affinity diagramming stage.

5.3. Affinity Diagrams

We assumed different roles such as Interviewer, Note Taker, Work Modeler, Moderator etc. and created the affinity diagrams to categorize the user stories and major concerns raised in the interviews.

In this, we realized that most of the users faced issues in fetching financial information on the website quickly. Also, the language was only supported in English language and information on job prospective was not available readily to most of the users. We made a plan to resolve these issues iteratively and sample images of our affinity diagrams are as follows:

5.4. Visioning and Ideation

In the final stage of visioning, we segregated affinity notes created on the wall as Design Ideas, Key Issues and Holes with proper color scheme. By appropriately prioritizing the affinities, we moved towards resolving the issues and bettering the existing design by brainstorming.

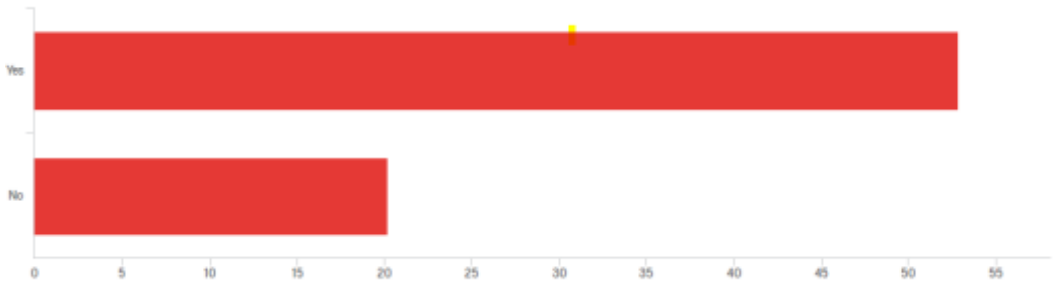
6. Survey and Analysis

To gather quantifiable data from the users regarding the website's usability and experience, we asked them to fill out an online survey hosted on NCSU Qualtrics. The link to this survey is given in the Appendix section. This survey presented a wide variety of 35 questions ranging from rhetorical (yes/no) type, likert scale type, and free text type as well.

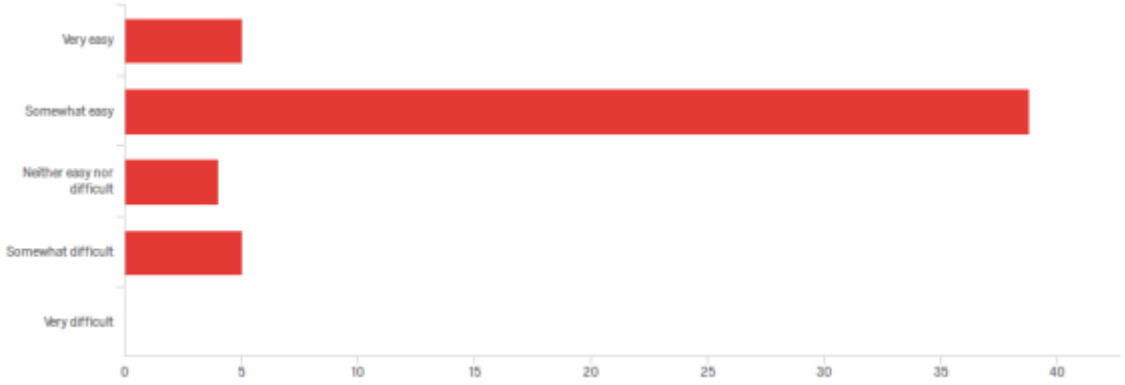
Questions were asked to understand if enough visual cues and relevant images/icons were added for the user, and if yes, were they relevant to the information they were trying to seek. We also asked if they were successfully able to get information with minimal efforts and if users found adequate and quality content on the website.

We received a total of 72 responses over the course of 1 week. Based on all these, we then analyzed the data, to seek and resolve the major pain points of users. We made sure that these points are addressed well into our new proposed model for making the website more user friendly. Link for obtaining the detailed document on survey analysis is provided in the Appendix section. Following are a few example responses from the survey for showcase purposes. Apart from these rating based statistics, we had some very good responses in the free text based questions too, and can be viewed in the survey analysis document.

Question: Could you find the information you were looking for?



Question: Please rate how easily you were able to find the information you were looking for.



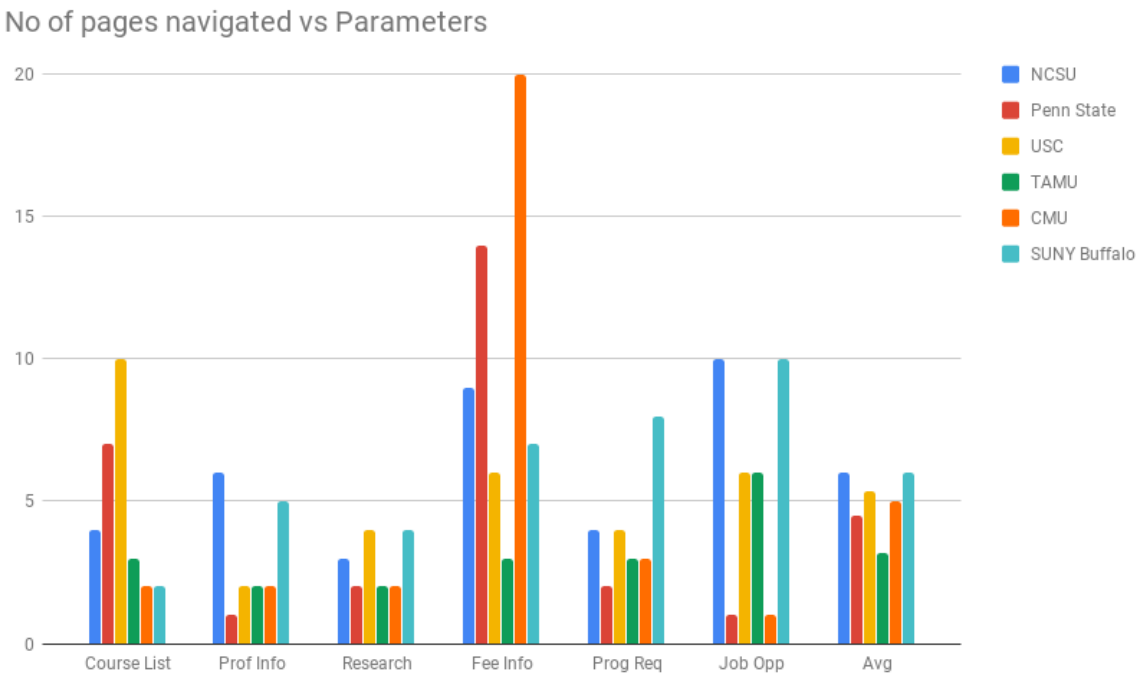
Question: Please rate the CSC website on each of the following –

Question: How well does the CSC website serve your requirements in each of the following?

What we understood in the analysis was that most users had difficulty finding the Financial Information about courses and needed more Assistance in filling out Applications. There appeared to be many ambiguous terms on webpages and organization of content was not satisfactorily good according to the results of survey. We saw a window of improvement here, and worked on that in our new model to address these issues.

7. Competitive Analysis

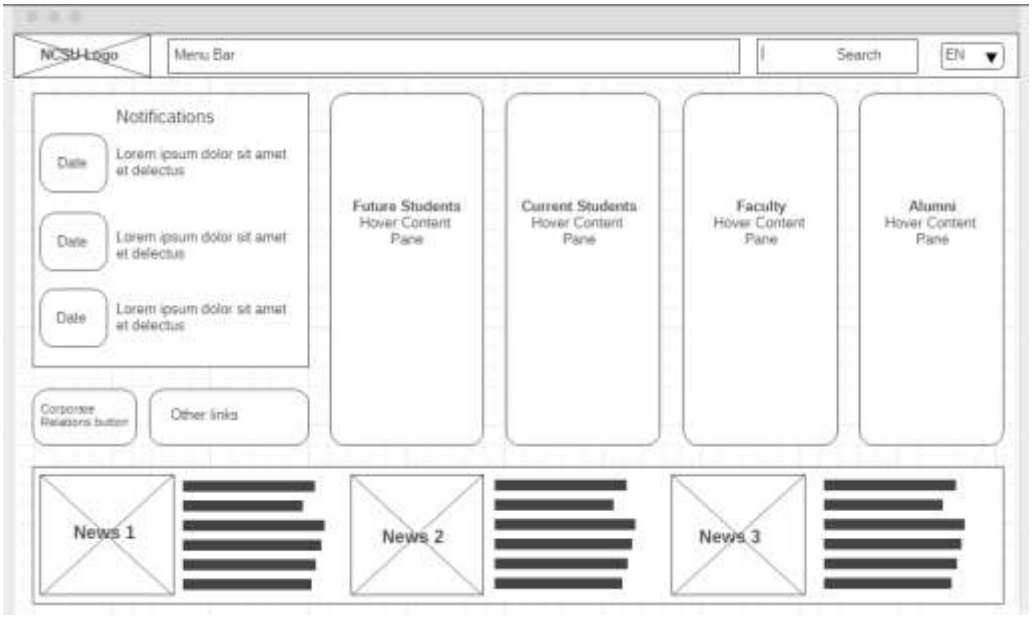
In order to perform a competitive analysis of the CSC website, we chose to study 6 other CSC websites of different state universities similar to NCSU in terms of courses and ranking from different US locations. The following chart concisely summarizes the information we sought out. We primarily assessed how many pages were navigated (Y-Axis) to find a particular type of information (X-Axis i.e. Parameter) on each of these competitor websites as compared to NCSU's CSC website:



As observed, NCSU's CSC website compares well with other websites, when it comes to finding information about Courses, Research and Program Requirements. However, information about Job Opportunities after education, Fee Structure, and Faculty takes number pages to be navigated before the user can access it. From the survey we had inferred that financial information is something current and future students seek out more often, and it is not easily available to them as compared to other universities which proved by this chart. Our new proposed model fixed these issues by bettering the navigation and menus.

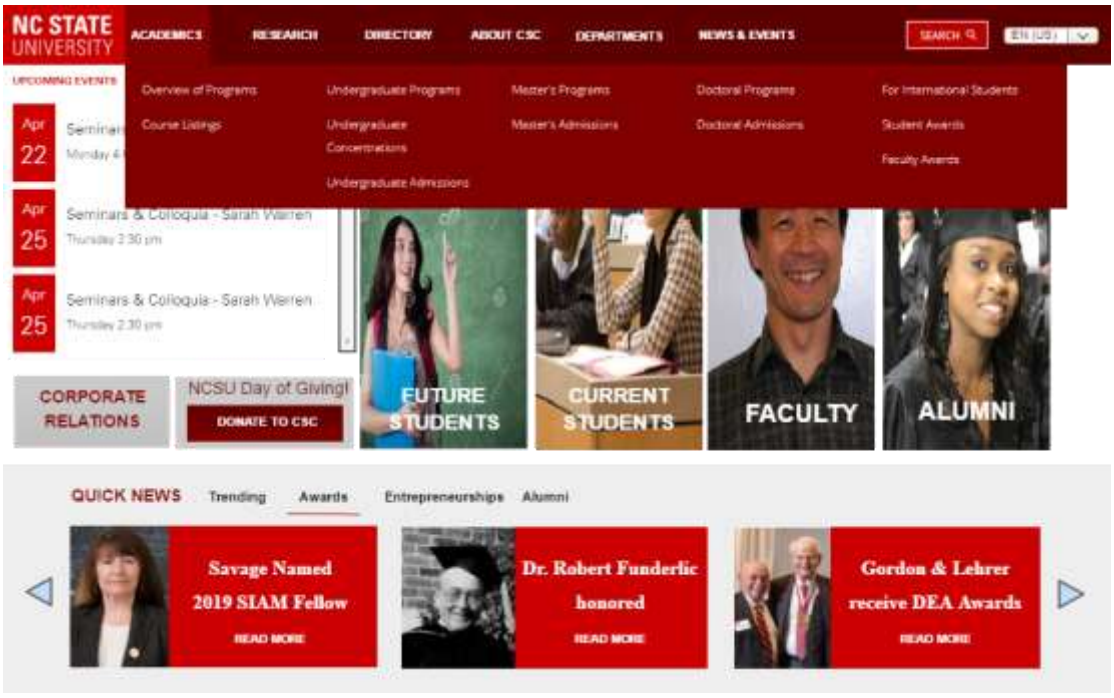
8. Prototyping

Based on the results gathered and analyzed from the interviews, affinity diagrams, survey, competitive and task analysis, we created a new model of the CSC website using wireframe technique as follows:



The following image presents what the actual website design would look like once re-modeled after we patch all the components in the wireframe with real ones. Notice that we focused on

1. Ease of Navigation
2. Finding information quickly: So for example when users hover over Navigation bar, the menu is displayed on the screen with quick links to all sections which majority users are interested into.
3. Maintaining consistency: Keeping a uniform color scheme throughout the website.
4. Prioritizing and providing quality content.

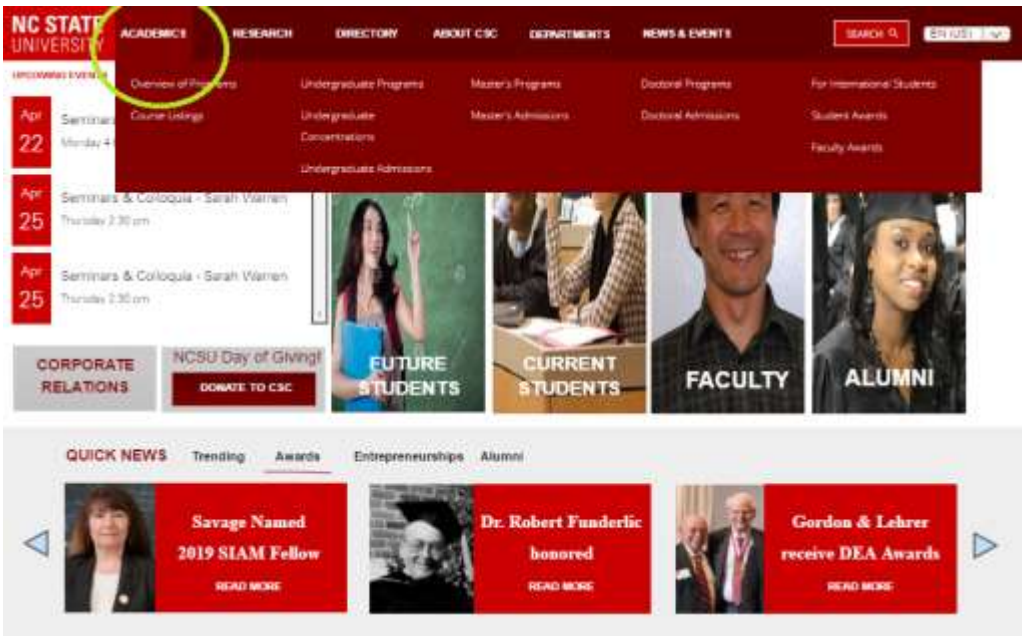


9. Internationalization

Finally, we noticed that the CSC website is only supported in English language and lacked support for international languages like Spanish, Chinese, Hindi, Japanese etc. So we decided to add this feature as well, in our proposed new model of the website. Furthermore, multi-lingual screen readers could also be used to provide support to visually disabled people browsing the website.

10. Heuristic Evaluation on Proposed Model

Once we proposed the new model, we again performed a Heuristic Analysis on the improved model, and checked if we have successfully patched the issues previously raised and if new ones have emerged. The following 2 evaluations are a sample from a large pool of such analyses which for this report demonstrate effectively how we proved our fresh model to be more user friendly and functional. Here the "Current Student" persona has been used.

No. HE1	Problem/Good Aspect: Good
Name: The navigation bar properly indicates which tab the user is browsing/hovering.	
Evidence: **Heuristic:** Visibility of system status **Interface Aspect:** The main navigation bar of the website at the top, as circled in below picture. 	
Explanation: The Navigation bar successfully displays what page the user is browsing or has hovered by changing the shade of maroon color other than rest of the tabs. This follows the HE1, where *Visibility of System Status* is handled.	

Justification (Frequency, Impact, Persistence, Weights):

Frequency: Common. The current selected tab appears on every page of the website.

Impact: The impact is critical and in a good way. The user instantly knows which page he/she is on and can navigate further accordingly. Furthermore, the menu that is displayed on hovering over a tab on navigation bar, reduces the number of clicks and pages to be browsed to open required links.

Persistence: Persistent. This is not an issue, but the design is persistent for all members on the *People* page of the website, which is a good thing.

Weights: This is a very subtle feature however a critical one. It relates to the real-world scenario as if the user has placed a bookmark to remember the current tab and page that is being browsed. It certainly aids in improving the user experience.

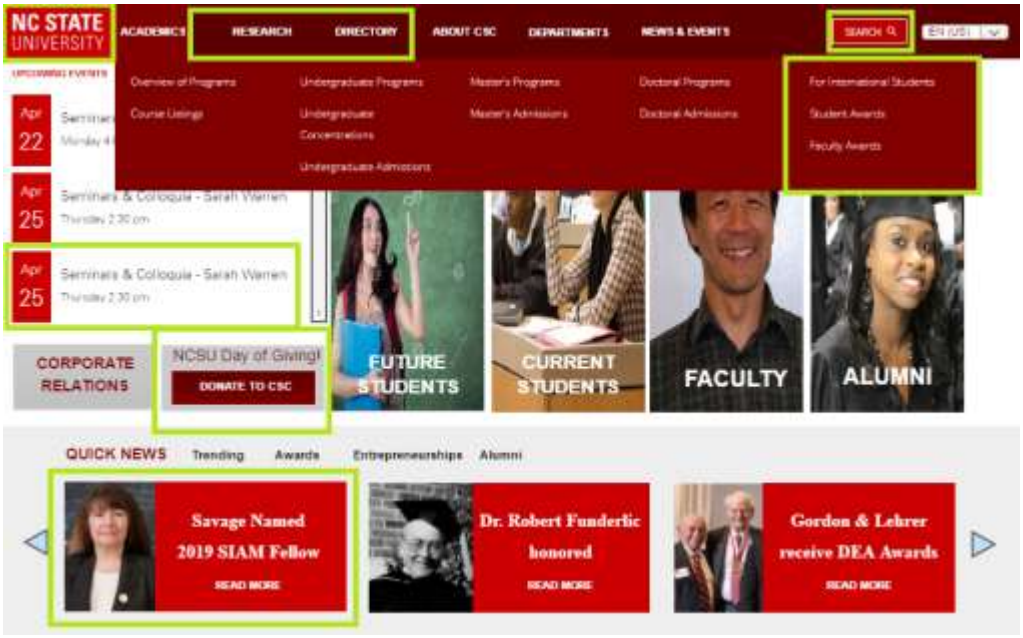
Possible solution and/or Trade-offs: There needs to be no solution, since this is not a problem in the website and also there no trade-offs in this scenario.

Relationships: Not applicable for this.

No. HE4	Problem/Good Aspect: Good

Name: The website has a consistent and standard color scheme on the webpages.

Evidence:
Heuristic: Consistency and Standards
Interface Aspect: Overall color scheme on the entire website.



Explanation: The color scheme on the webpages is shades of red, maroon and white which are consistent on everywhere throughout the website. This follows the HE4, where *Consistency and Standards* is handled.
Justification (Frequency, Impact, Persistence, Weights): Frequency: Common. The current selected tab appears on every page of the website. Impact: The impact is critical and in a good way. A fixed set of UI colors maintains consistency and does not distract or disturb the user interaction with the website. Furthermore, a fixed set of UI components styles also mean that the user exactly knows what, where and how to navigate once he/she gets used to the user experience design. Persistence: Persistent. This is not an issue, but the design is persistent for all members on the *People* page of the website, which is a good thing. Weights: This is a critical weighted feature. Consistency in UI adds to the user friendliness and also becomes a standard trademark in few cases. For example, NCSU follows the Red-White color scheme even on flags, mascots and emblems and the website color scheme maintains the brand.
Possible solution and/or Trade-offs: There needs to be no solution, since this is not a problem in the website. Trade-Off: It might be possible that color blind people who cannot distinguish red color might suffer due to this color scheme.
Relationships: Not applicable for this.

11. Conclusion

We conclude this report with a new proposal of the CSC website with improved user experience, look & feel, quality content and proper organization of data, which is thoroughly backed and proven by the core principles of Human-Computer Interaction.

12. Appendix

12.1. NCSU CSC Department Website Link: https://www.csc.ncsu.edu/

12.2. Nelson's Heuristic Rules: https://www.nngroup.com/articles/ten-usability-heuristics/

12.3. UAR Reports Link: https://github.com/pratik-abhyankar/hci-report/UAR.pdf

12.4. Contextual Design (Affinity): https://github.com/pratik-abhyankar/hci-report/affinity

12.5. Survey Link: https://ncsu.qualtrics.com/jfe/form/SV_86x2Cer7OUs3Jid

12.6. Survey Results Link: https://github.com/pratik-abhyankar/hci-report/survey_results.pdf

12.7. Competitive Analysis Document Link: https://docs.google.com/spreadsheets/d/1RPyRzfuKuIxq1zzxu8zwc_TRG4CbPPSFqs33tzGhPfQ/edit?usp=sharing