



UNIVERSITY OF MICHIGAN
WOLVERINE ACCESS

Cognitive Principle & Heuristic Evaluation

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Overview

Wolverine Access (<http://wolverineaccess.umich.edu/>) is a comprehensive website for providing students with the ability to browse, search, and register for courses, along with checking grades, or maintaining University financial accounts or personal contact information. Key site sections include: (a) View Enrollment Appointment; (b) Backpack/Registration; (c) View Class Permissions; (d) View Class Schedule; (e) Disenrollment Information; and (f) Class Search.

Methodology

In our evaluation of Wolverine Access (Wolverine), we utilized an assortment heuristics and cognitive principles, including Shneiderman's eight golden rules, Wicken's principles of display design, and Nielsen's heuristics/design principles, as well as task scenarios for new and returning-user personas, which were developed by the team. To rank the problems we used a Five-point scale of severity that ranges from 1 to 4, with 1 meaning that there is no or little problem and 4 meaning the problem is considered critical.

Key Findings

The team was able to identify major problem areas and several success areas during the process of using the Enrollment feature. These findings, in conjunction with previous and future reports will aid us in improving the overall usability through understanding of cognitive ergonomics.

Overall, the Wolverine website is successful in using many common cognitive tools and techniques along with following certain usability heuristics. The site performs especially well in terms of visual consistency (i.e., look and feel).

However, this visual consistency can and does work against the site and user at critical junctures and times. There are several ways in which the site could be improved for its users from a cognitive standpoint, simply by adhering to commonly accepted cognitive principles and usability heuristics:

1. Giving better sense of visual momentum across features/screens during specific, task-based usage and generally throughout the site.
2. Providing better perceptual cues (i.e., discriminability and redundancy gain).
3. Lowering the information access costs in certain key areas/features.

Introduction

Project Overview
Description of Wolverine Access
Target Population
Project Goals

Project Overview

To date, the team has explored Wolverine at a very fine granularity using several sets of heuristics and cognitive principles (i.e., Nielsen, Schneiderman, and Wickens).

Description of Wolverine Access

Wolverine is a restricted website that provides information for students enrolled at the University of Michigan. The functionality of the site is extensive and contains five distinct feature areas or sections, including: Enrollment, Academic Record, Financial Information, Personal Information, and Job Information. For the purpose of this evaluation, the team limited itself to the Enrollment section. Key tasks include:

- Checking class schedule
- Finding specific classes
- Adding classes to backpack
- Browsing classes
- Getting/using class overrides

Target Population

The target audiences of the Enrollment section of the Wolverine Access are the students registered at the University of Michigan, both Graduate and Undergraduate students. From these groups, the site is also targeted to both first-time and repeat users of varying demographics.

Project Goals

The goal of this evaluation was to quickly and inexpensively assess cognitive demands and usability of the site for the purpose of identifying potential problem areas suitable for redesign. With each problem that we identify, we also provide recommendations for improving usability of the site.

Overview

For the purpose of conducting this evaluation, the Team considered a total of twenty (20) top-level cognitive principles and heuristics (and their related facets or sub-points). After careful deliberation, the team settled on a short list of sixteen (16) principles and heuristics that it decided were relevant to the project at hand and which we eventually used for the purpose of evaluating, including:

- Strive for consistency
- Enable frequent users to use shortcuts
- Design dialogs to yield closure
- Offer informative feedback
- Support error prevention and management
- Permit easy reversal of actions and error tolerance
- Redundancy gain (Perceptual)
- Discriminability (Perceptual)
- Minimize information access costs (Attention)
- Match between system and the real world (Top-down processing)
- Recognition rather than recall (Reduce short-term memory load)
- Help and documentation
- Aesthetic and minimalist design
- Proximity-compatibility principle (Attention)
- Principle of predictive aiding (Memory)
- Principle of knowledge in the world (Memory)

A full list of the heuristics and principles considered can be found in Appendix A.

Note: The evaluation was carried out by all six team members, both on an individual level and as part of a group exercise.

Severity Ratings

After the site was evaluated, we applied a rating scale based on a suggested model by Jakob Nielsen to rank the problem in terms of severity.

Rating	Description
4	Imperative to fix this problem before product can be released.
3	Major problem: important to fix, so should be given high priority.
2	Minor problem: fixing this should be given low priority.
1	Cosmetic problem only: need not be fixed unless extra time is available on project

User Scenarios

Because the site offers multiple types of functionality and several distinct areas for tasks related to enrollment at the University, our team focused on those feature areas and functional tasks related to course enrollment, including the registration appointment, class search, backpack provisioning and maintenance, schedule overview and maintenance, and possible disenrollment.

Usage Scenarios

> **First-time user:** This is James' first year, first term of college. There are a few core classes required by his degree; he has a list of the two that he must take, which was provided by the admissions office. However, he must take two additional ones—both of his choosing—and he's both thrilled and terrified at the thought that he must choose.

> **Repeat user:** This is Anne's first year, going into her second term of graduate school. There are a few core classes required for her degree, but other than that, she is on her own re: designing her course plan for the semester. Some areas, besides her Environmental Studies Program, that she is interested in include Anthropology, Business, Economics, and Engineering.

Findings

Summary of Findings
Detailed Findings – Problem Areas and Proposed Solutions

Summary of Findings

Three main problem areas have been identified: (a) high information access costs; (b) lack of perceptual cues; and (c) inadequate information feedback.

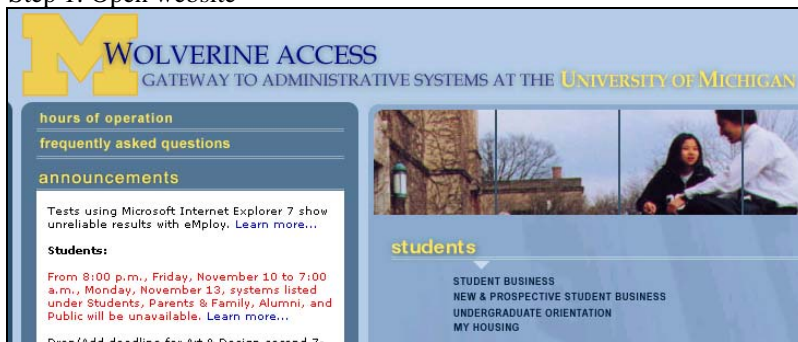
The following table summarizes the Team’s findings; the section that follows details findings and proposed solutions.

Problem No.	Problems identified	Rating
#1	Higher information access cost for user location	4
#2	Lack of discriminability between different sections	4
#3	Requires recall, not recognition	3
#4	High information access cost for course listing	3
#5	Poor match between system and real world	3
#6	No shortcut between class search and registration	2
#7	Limited user help capabilities	2
#8	Poorly phrased information messages for dropping courses	1
#9	Poorly designed feedback messages	1

Problem Area #1: High information access cost for user location

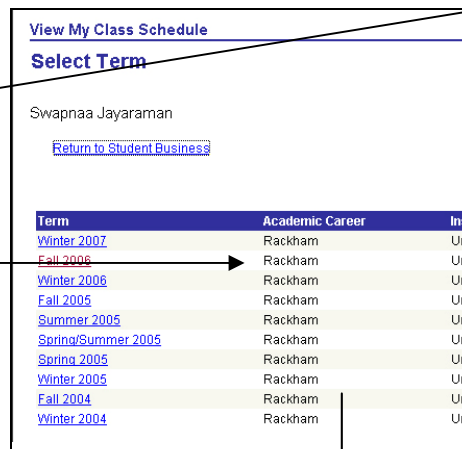
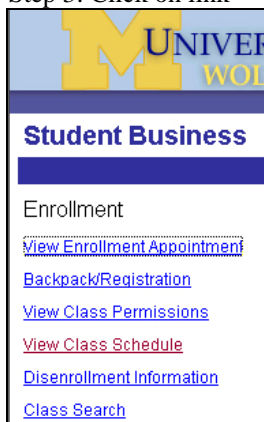
Although the fact that the Wolverine systems strives for visual consistency, and every page of the system truly looks alike, this becomes a distinct disadvantage when one considers the need for “visual momentum” across the various features or screens. One drawback to the standardized look and feel of the site is that it is potentially hard for users to situate themselves within the site, especially when performing a multi-step task. For instance, if the user has to access the schedule calendar, he or she has to go through several steps and clicks (See Figure 1A).

Step 1: Open website



Step 2: Login

Step 3: Click on link



To “schedule” below the fold

Figure 1A: Various steps, pages and clicks to view schedule calendar

Proposed Solution(s) for #1: High information access cost for user location

A better solution would be to provide a frame of reference for the users to see where they are situated within the website. The use of frames will enable the user to locate him or herself in the website and traverse the website easily without going through multiple pages (See Figure 1B).

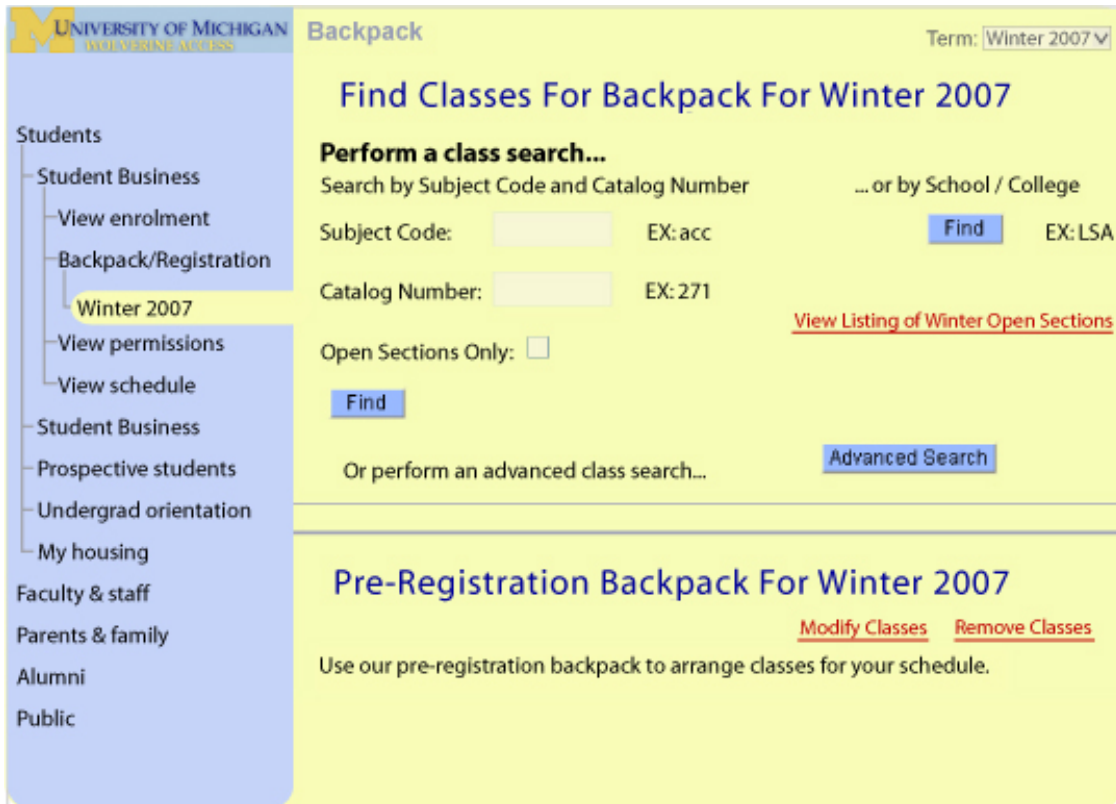


Figure 1B: Various steps, pages and clicks to view schedule calendar (redesign).

Problem Area #2: Lack of discriminability between different sections

Since Wolverine strives for visual consistency, another drawback is difficulty distinguishing one page from another. This may result in confusion about where one is in the system. For example, the “Find Classes” pages for Backpack and Registration pages are extremely similar in terms of color, layout, and wording (See Figures 2A and 2B).



Figure 2A: Backpack Page.



Figure 2B: Registration Page.

Due to the similarities shown in the above figures, users may become confused or misled about which page they are on. Although there are hints and written cues indicating which page is in use, this information does not stand out. If the user is not familiar with the system or is under time-pressure, he or she may not be able to recognize the differences immediately. The first time user who is not familiar with the system may also be confused and not certain how to proceed. The biggest problem with this lack of discriminability is that classes may be added to a student’s “Backpack” instead of the real “Registration” by mistake.

Proposed Solution(s) for #2: Lack of perceptual cues between pages/sections

To fix this problem, more visually distinctive should be provided to differentiate the two sections. Each section should be color-coded using two different colors, as shown in Figures 2C and 2D, so that users realize that they are different pages when using the system. In addition, the words “Search” and “Registration” should be made more prominent to stand out to the users so they can easily tell which page they are working in.



Figure 2C: Search Page (redesign).



Figure 2D: Registration Page (redesign).

Problem Area #3: Requires recall, not recognition

The course listing feature does not provide the course name, thus requiring users to remember the class and/or subject number (versus easily identifying course by title), as shown in Figures 3A and 3B. The class number is not very useful to users if they do not know which number corresponds to which class. Often the user only knows the name of the courses instead of its catalog or class number. If the system provides the name of the class, it can greatly reduce the cognitive load of the user and information access cost when trying to select or guess which class she or he wants to drop without clicking into the detail page each time.

Registration Processing
Registration Drop Classes For Winter 2007

Click class number to proceed.

[Return to Registration Page](#)

Class Nbr	Subject / Catalog#	Section	Enrollment Status	Credits	Formal Description
20897	SI 543	002	Enrolled	3.00	Graded
20925	SI 551	001	Enrolled	3.00	Graded
11201	SI 646	001	Enrolled	3.00	Graded
20579	SI 652	001	Enrolled	3.00	Graded

Figure 3A: Select Class to Drop.

Registration Processing
Registration Modify Classes For Winter 2007

Click class number to proceed.

[Return to Registration Page](#)

Class Nbr	Subject / Catalog#	Section	Enrollment Status	Credits	Grading Basis
20925	SI 551	001	Enrolled	3.00	Graded

[Return to Registration Page](#)

Figure 3B: Select Class to Modify.

Proposed Solution(s) for #3: Requires recall, not recognition

When students think about a course, they often consider the subject or topic, rather than the “catalog number.” Similarly, when dropping or modifying a course, users may prefer information that helps them identify the correct one to drop or modify. Course title is a crucial piece of information for students to recognize, but this information is absent from the current interface. This information should be added, as shown in Figures 3C and 3D, so that need not recall this information or navigate elsewhere to find it out. This can save users from clicking into the “Class Nbr” just to see what course the numbers represent.

Registration Processing

Registration Drop Classes For Winter 2007

Click class number to proceed.

[Return to Registration Page](#)

Class Nbr	Subject / Catalog#	Course Title	Section	Enrollment Status	Credits	Formal Description
20897	SI 543	Programming I	002	Enrolled	3.00	Graded
20925	SI 551	Info Seek Behav	001	Enrolled	3.00	Graded
11201	SI 646	Info Economics	001	Enrolled	3.00	Graded
20579	SI 652	Electronic Commerce	001	Enrolled	3.00	Graded

Figure 3C: Drop Classes Listing (redesigned).

Enrollment

Swap Classes For Winter 2007

To perform a class swap, locate the class you wish to drop from the list below. Click Search by Subject or Advanced Search button to perform a class search to find a class to add.

[Return to Registration Page](#)

Class Nbr	Swap From Class	Course Title	Enrollment Status		
20925	SI 551 Section 001	Info Seek Behav	Enrolled	Search by Subject	Advanced Search

Figure 3D: Swap Classes Listing (redesigned).

Problem Area #4: High information access cost for course listing

The course listing page presents comprehensive information to students so that they can see all information needed to make registration decisions. However, accessing information via this page often comes at a high cost. This is especially true in determining if a course is the “primary section” for enrollment and title of the course.

Students may have difficulties determining if a given course is a primary section for enrollment. One problem with the information display is that the legend for the “Primary Section” is located far from the actual marking, marked with a red box in Figure 4A. Since the meaning of the check to the left of the class number is not intuitive, the legend should be visible to users. Furthermore, employing a “check box” to indicate “primary section for enrollment” is not intuitive. Users can be easily mistaken to think that the “checked” courses are the ones that are “selected”, causing unnecessary confusion.

SI	110	Intr to Info Studies		4 Credits					
	Status	Comp	Section	Days	Time	Location	Instructor	Notes	Topic
	19992	Open	LEC 001	TTh	11:30 am-01:00 pm	ARR	Frost		
	<input checked="" type="checkbox"/> 19993	Open	DIS 002	W	12:00 pm-01:00 pm	412 WH	Hughes, Frost		
	<input checked="" type="checkbox"/> 19994	Open	DIS 003	W	01:00 pm-02:00 pm	412 WH	Hughes, Frost		
SI	502	Choice & Learning		3 Credits					
	Status	Comp	Section	Days	Time	Location	Instructor	Notes	Topic
	11184	Open	LEC 001	F	10:00 am-12:00 pm	311 WH	Olson, Chen		
	<input checked="" type="checkbox"/> 11185	Open	DIS 002	F	01:00 pm-02:00 pm	409 WH	Osepayshvili		

Figure 4A: Course Listing with Primary Section Information.

Proposed Solution(s) for #4: High information access cost for course listing

When surfing websites, people often read in an “F” shape. Information on the top left corner is most frequently read. The information about “primary section for enrollment” is important to students when choosing courses, and should be very prominent to the user. To eliminate confusion, the legend should be moved to the top left corner of the screen so that it is more easily perceived, reducing the need for users to search for this information. In addition, the “check” should be changed to a letter “P” to indicate “primary”. This alternative representation will not confuse users with the idea of “selected courses”. The letter “P” is not associated with other ideas, and with the legend at a prominent visual display position, users can easily find what it means. This recommended layout is shown in Figure 4B.

Add Classes

Information **Winter 2007**

[Expand All](#) [Collapse All](#) [Return to Backpack Page](#) [Return to Subject Search Page](#)

Indicated a primary section for enrollment

SI 110 Intr to Info Studies 4 Credits

Status	Comp	Section	Days	Time	Location	Instructor	Notes	Topic
19992 Open	LEC	001	TTh	11:30 am-01:00 pm	ARR	Frost		
<input checked="" type="checkbox"/> 19993 Open	DIS	002	W	12:00 pm-01:00 pm	412 WH	Hughes, Frost		
<input checked="" type="checkbox"/> 19994 Open	DIS	003	W	01:00 pm-02:00 pm	412 WH	Hughes, Frost		

SI 502 Choice & Learning 3 Credits

Status	Comp	Section	Days	Time	Location	Instructor	Notes	Topic
11184 Open	LEC	001	F	10:00 am-12:00 pm	311 WH	Olson, Chen		
<input checked="" type="checkbox"/> 11185 Open	DIS	002	F	01:00 pm-02:00 pm	409 WH	Osepajsthill		

Figure 4B: Course Listing with Primary Section Information (redesigned).

Problem Area #5: Poor match between system and real world

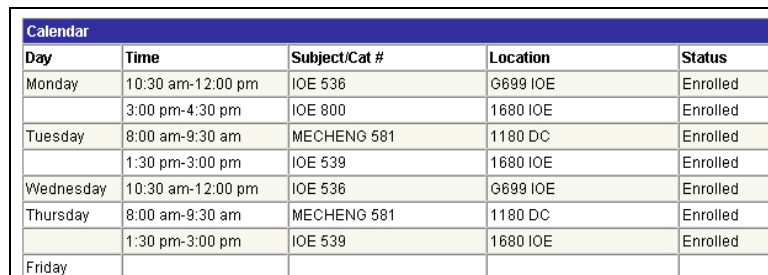
Another issue that our team found involved the presentation of the class schedule once the term (e.g., Winter 2007) had been specified. Once the appropriate term link has been clicked, the user first sees a list of classes presented as shown in Figure 5A.



Course	Section	Component	Description	Grading Basis	Credits	Status
IOE 536	001	Lecture	Cognitive Ergo	Graded	3.00	Enrolled
			10:30AM 12:00PM Mon,Wed	G699 IOE		09/05/2006 - 12/13/2006
			Instructor: Barber, Nadine Barbara			
IOE 539	001	Lecture	Occup Safety/Engr	Graded	3.00	Enrolled
			1:30PM 3:00PM Tues,Thurs	1680 IOE		09/05/2006 - 12/13/2006
			Instructor: Keyserling, William M			
IOE 800	001	Seminar	First Yr Doc Sem	Graded	1.00	Enrolled
			3:00PM 4:30PM Mon	1680 IOE		09/05/2006 - 12/13/2006
			Instructor: Keyserling, William M			
MECHENG 581						

Figure 5A: Class Listing.

The classes are listed in alphabetical order by course abbreviation and course number, while the course title is not one of the first items listed, nor made prominent in bold. Additionally, while this view is informative, it doesn't easily allow the user to easily determine what class he or she has on a given day, or find openings in one's schedule. The schedule format that facilitates the previous two criteria actually occurs at the bottom of the web page, as shown in Figure 5B.



Day	Time	Subject/Cat #	Location	Status
Monday	10:30 am-12:00 pm	IOE 536	G699 IOE	Enrolled
	3:00 pm-4:30 pm	IOE 800	1680 IOE	Enrolled
Tuesday	8:00 am-9:30 am	MECHENG 581	1180 DC	Enrolled
	1:30 pm-3:00 pm	IOE 539	1680 IOE	Enrolled
Wednesday	10:30 am-12:00 pm	IOE 536	G699 IOE	Enrolled
Thursday	8:00 am-9:30 am	MECHENG 581	1180 DC	Enrolled
	1:30 pm-3:00 pm	IOE 539	1680 IOE	Enrolled
Friday				

Figure 5B: Class Schedule.

Viewing the class schedule in this format requires the user to scroll or page down to the very bottom. The time and extra actions required to retrieve the desired piece of data increased the cost of information access. In order to remedy the situation, the most important information, such as the course title, should be loaded first. In the event that someone is interested in knowing less desirable pieces of data, such as class and section number, this information should be available further down on the page. Another area of concern is the fact that the given class locations are often times not known by students, even experienced ones. Students would have to look up the abbreviation on the registrar's website to determine the full building name, and then further search for the building on a map. To remove this hassle, a shortcut hyperlink should be provided in the body of the schedule which would allow users to quickly see a campus map with the location highlighted, as well as the full name of the building.

Proposed Solution(s) for #5: Poor match between system and real world

A better way to facilitate this is to provide both the course name and lecture time, in addition to the table of courses (mentioned before). The system can achieve this through adding the name and time to the list. Also, to provide a better representation of the class schedule help students do better scheduling (See Figure 4C)

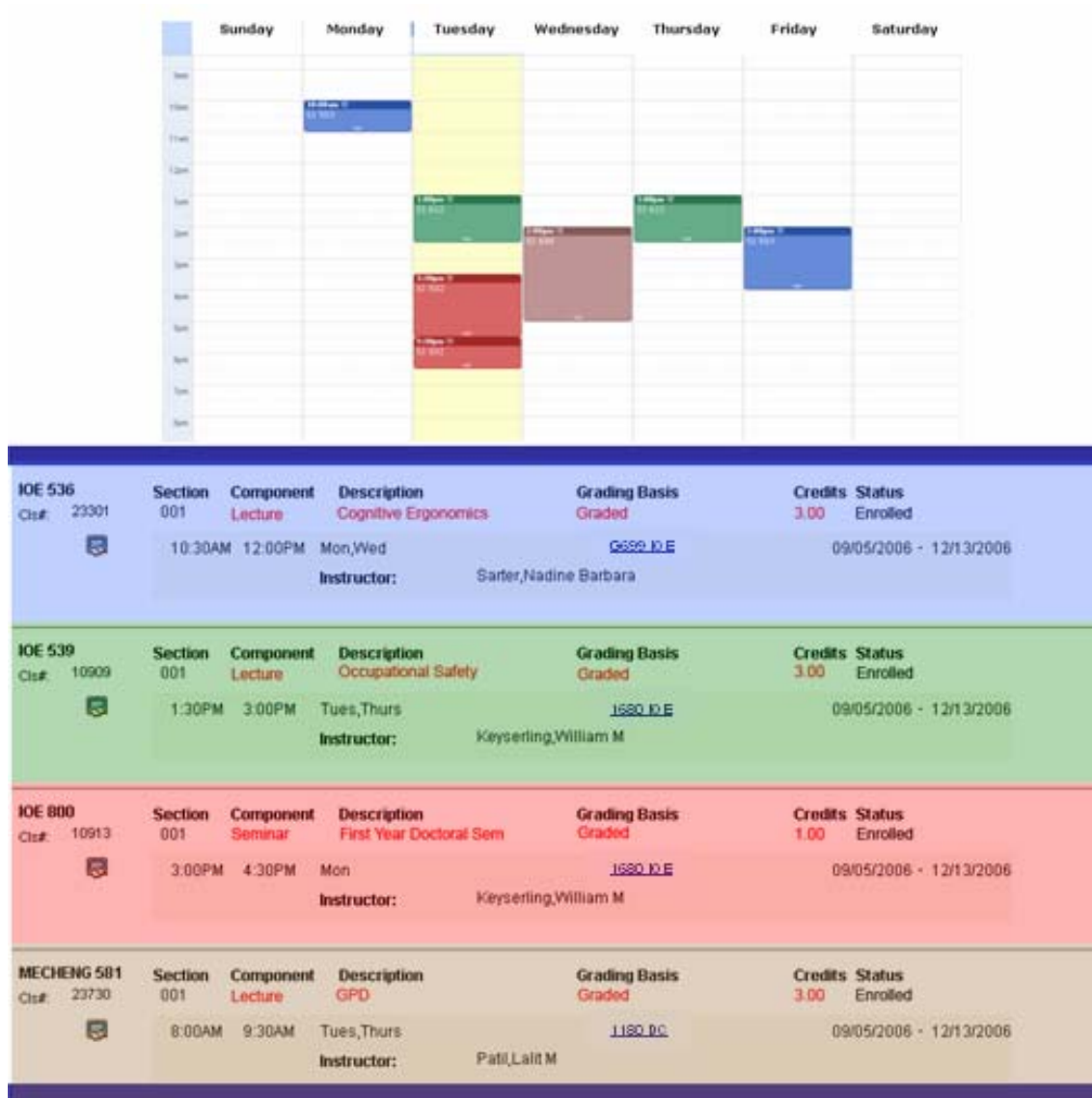


Figure 5C: Class Schedule (redesign).

Problem Area #6: No shortcut between class search and registration

When trying to register or add classes to the backpack, it is anticipated that new users will first go to the Class Search section. This is the logical first step for users who do not know the exact subject code and catalog of the class they wish to take. After finding an appealing course, users cannot go directly from the Class Search section to the Registration section. This would be a logical shortcut to include, even if it was as simple as allowing registration functions from the Class Search section. Alternatively, as the Class Search section does not include any additional capabilities beyond the Registration section, it would be possible to eliminate the Class Search section completely. Users could then carry out search functions from the Search and Registration section.

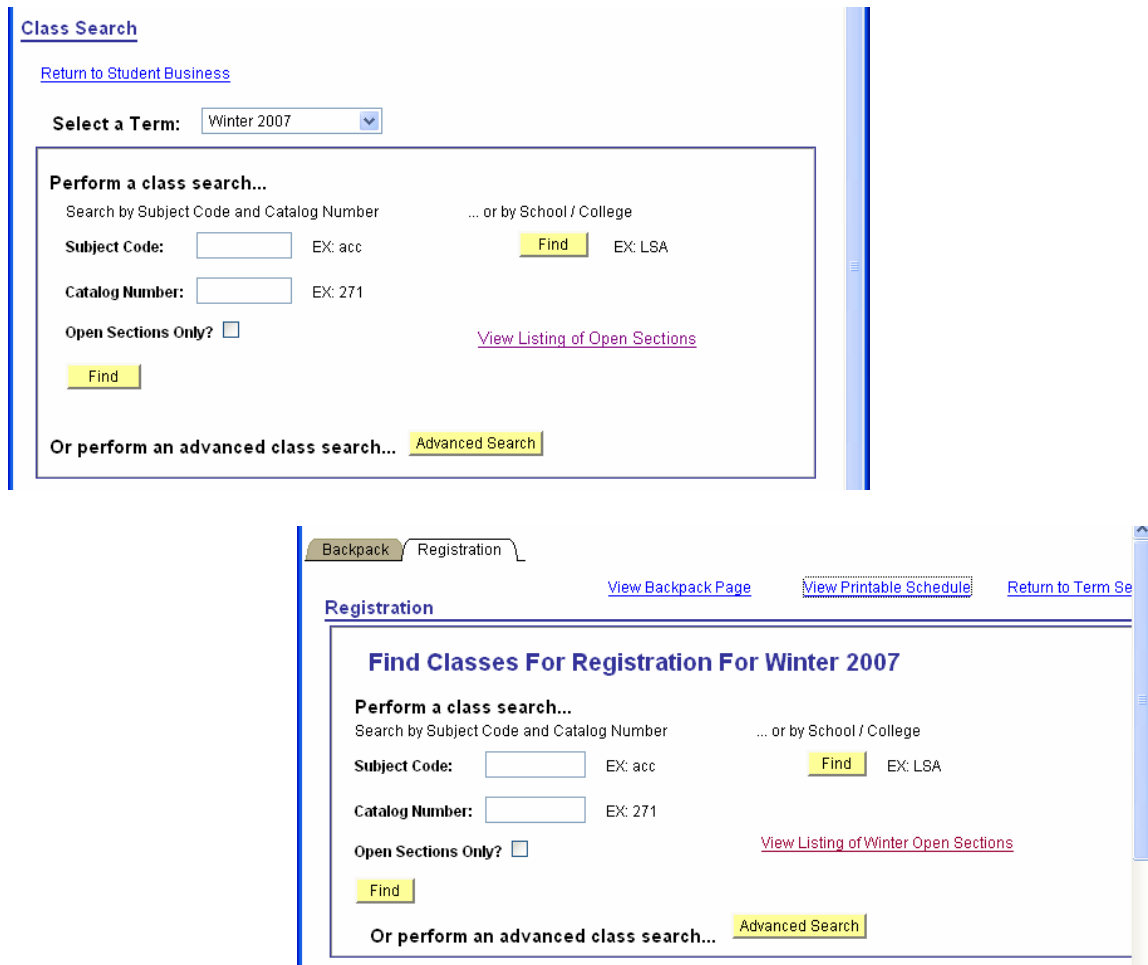


Figure 6A: No shortcuts.

Proposed Solution(s) for #6: No shortcut between class search and registration

After evaluating the website we discovered that the “Class Search” has exactly the same function as Backpack with the inability to do anything with the courses users find. To reduce the confusion of users, we recommend removing the “Class Search” feature, and rename the “Backpack” to “Search.” This way, users can search courses in the “Search” area with an option to add the course to his/her “Wish List” (details in Problem Area #10). The user goes to “Search” to find his/her course just like s/he would do in the original “Class Search.” After s/he finds his/her course of desire, s/he have the ability to add the course to his/her “Wish List” (when it is not yet his/her time to register).

Similarly, when it comes to the student business page, we propose replacing “backpack” with “search” (Figure 6A). For the first time users, they usually use search for class first. Besides, we change the “add to backpack” button into “Add to wish list” to give users a clear meaning of the function (Figure 6B). That way people know that they can perform searching within the search tab and they will find themselves able to add course into wish list for future use (Figure 6C). At last, to prevent the situation that students who want to register the courses but add them into the wish list, we will set the default tab as registration. Users have to change the tab to wish list.

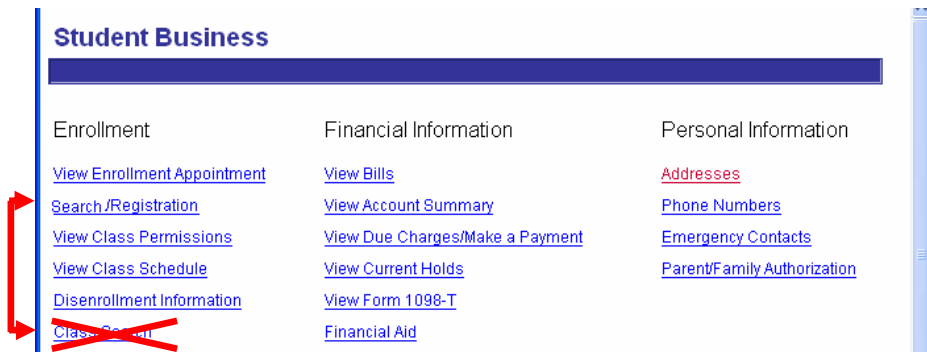


Figure 6B: No shortcuts (redesign).



Figure 6C: Provide “Add Class to Wish List” on the page with desired course.

Problem Area #7: Limited user help capabilities

There are many situations in which Wolverine users might need a “help” function. For example, instructions for use may be unclear from the main pages, or users may be in need of additional information about a certain topic. Whatever the need for the help function, it is expected that new users will be more likely to use the help function than those users familiar with the system.

The help available on Wolverine is somewhat lacking. The help in general does not provide a detailed outline of help topics to orient the user as to how one topic relates to others. From the main help page, the user is only given the eight help topics shown in Figure 7A.

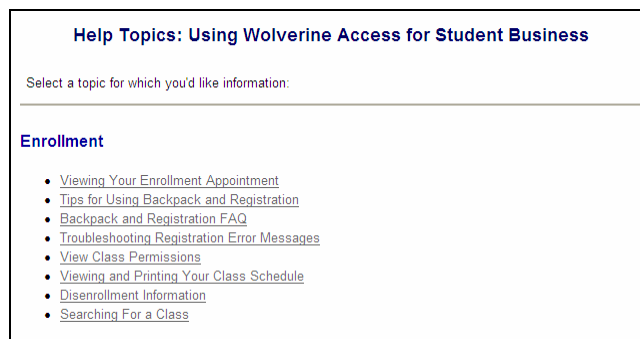


Figure 7A: Help Topics Main Page.

When someone clicks on “Tips for Using Backpack and Registration”, the user is redirected to a new page with the headers shown in Figure 7B. They no longer have a reference as to how these more detailed help topics relate to the previous topic selected. In order to correct this problem, when the user clicks on “Tips for Using Backpack and Registration”, the option should expand into more detail on the same page. Then the user can further decide which detailed help topic to choose.

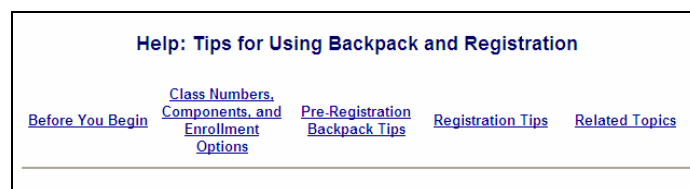


Figure 7B: Help Tips for Using Backpack and Registration.

The help capabilities of Wolverine Access also do not allow the user to search for help topics. This is especially a problem when provided with a long list of help topics, such as the example shown in Figure 7C. Here, the user is forced to read through every warning or error message, making it difficult or time consuming to find the error message they are looking for.

Help: Troubleshooting Registration Warnings or Error Messages

[Common Error Messages](#)
[Related Topics](#)

Common Warnings or Error Messages

When a registration request you send to the server is not successful, the system displays error messages to help you troubleshoot the problem(s). The list below contains the most common error messages you might encounter when registering for classes. Click the text of the error message to see tips for troubleshooting that specific message.

- [A course or credit limit has been exceeded. You may not receive credit or honor points for the course/credits that exceed the limit. Check your School/College's course information.](#)
- [Dept consent is needed to enroll in class. add not processed.](#)
- [Instructor consent is needed to enroll in class. add not processed.](#)
- [Invalid class number for enrollment.](#)
- [Invalid Input Value for Units Taken. Must be Between 'X' and 'Y'.](#)
- [Maximum Term Student Unit Load Limit exceeded.](#)
- [Multiple enrollment not allowed for course. Add not processed.](#)
- [Repeat election of course - is subject to School/College repetition rules.](#)
- [A required related class also needs to be selected.](#)
- [Requisites Not Met for Class. Not Enrolled.](#)
- [Student Not Enrolled. Class is full.](#)
- [Student Not Enrolled. Class & Waitlist are full.](#)
- [This course is taken out of sequence and you may not receive credit or honor points for it. Check your School/College's course information.](#)
- [Time Scheduling Conflict. Student Not Enrolled in Class.](#)
- [Unable to Drop Class. Will Put Student Below Minimum Units.](#)

Figure 7C: Help Troubleshooting Registration Warnings or Error Messages.

Lastly, some of the information contained within the help section is of little or no use. For example from the disenroll section of student business, the help link will result in a second window displaying the information shown in Figure 7C. It is unclear why this is included in the “help” dialogue and not simply added to the main page contents.

Help: Disenroll Information

For additional information, refer to the Disenrollment Procedures on the [Registrar Office's Web site](#) or email ro_registration_questions@umich.edu or phone (734) 763-5174.

Figure 7D: Help Disenroll Information.

Proposed Solution(s) for #7: Limited user help capabilities

In order to improve upon the help functions of Wolverine, several steps must be taken. Most importantly, the help should appear in a pop-up window, as shown in Figure 7E. This pop-up window will contain contents, answer wizard, and search tabs. The contents tab will allow the user to explore different help topics, maintaining an outline of all help topics. In addition, the answer wizard and search functions will allow the user to type in specific questions and keywords, respectively. The modified help system should also limit itself to relevant information. For example, the help information from the disenroll section already mentioned should be added to the main page contents.

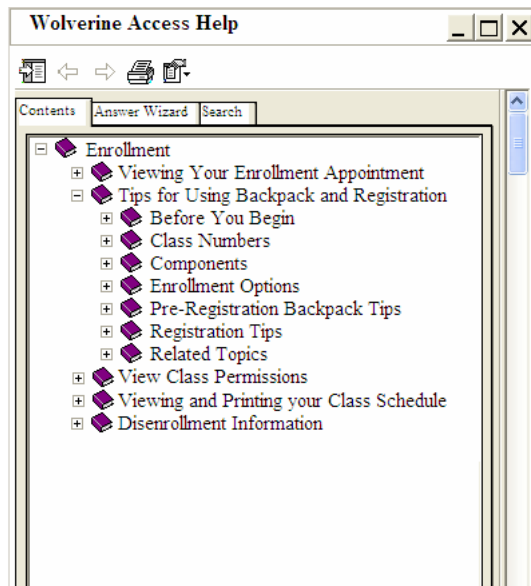


Figure 7E: Recommended Help Pop-up

Problem Area #8: Poorly phrased information messages for dropping courses

Another problem area deals with dropping courses from one's schedule. If a user decides to remove herself or himself from a class, there are two levels of confirmation needed to successfully perform the task. While this is beneficial in terms of keeping one from mistakenly dropping a class, one is not informed as to how many open seats (if any) are available and whether or not there is a waitlist for that class, as shown in Figure 8A.

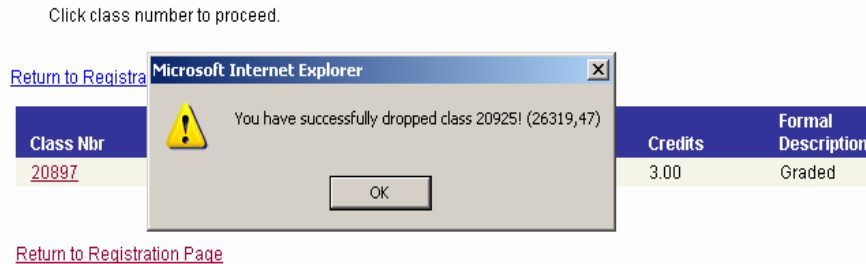


Figure 8A: Drop Class Page.

Typically during the registration time, students expect to be able to add and remove classes and experience no problems re-enrolling in a given class. However, in the event that there is a waitlist, the student will go to the end of the waitlist if they decide to drop. Many students may be unaware that there is a waitlist for the course (since there might not have been one when they initially signed up) and may unknowingly drop a class with the possible intention of re-signing up for it later.

Proposed Solution(s) for #8: Poorly phrased information messages for dropping courses

This concern falls under the design principle of offering informative feedback. To remedy this, the system should provide a cautionary note, which would let the user know whether or not there is currently a waitlist for the course and how many people are on this. This would more clearly influence their decision on whether or not they should indeed drop the class.

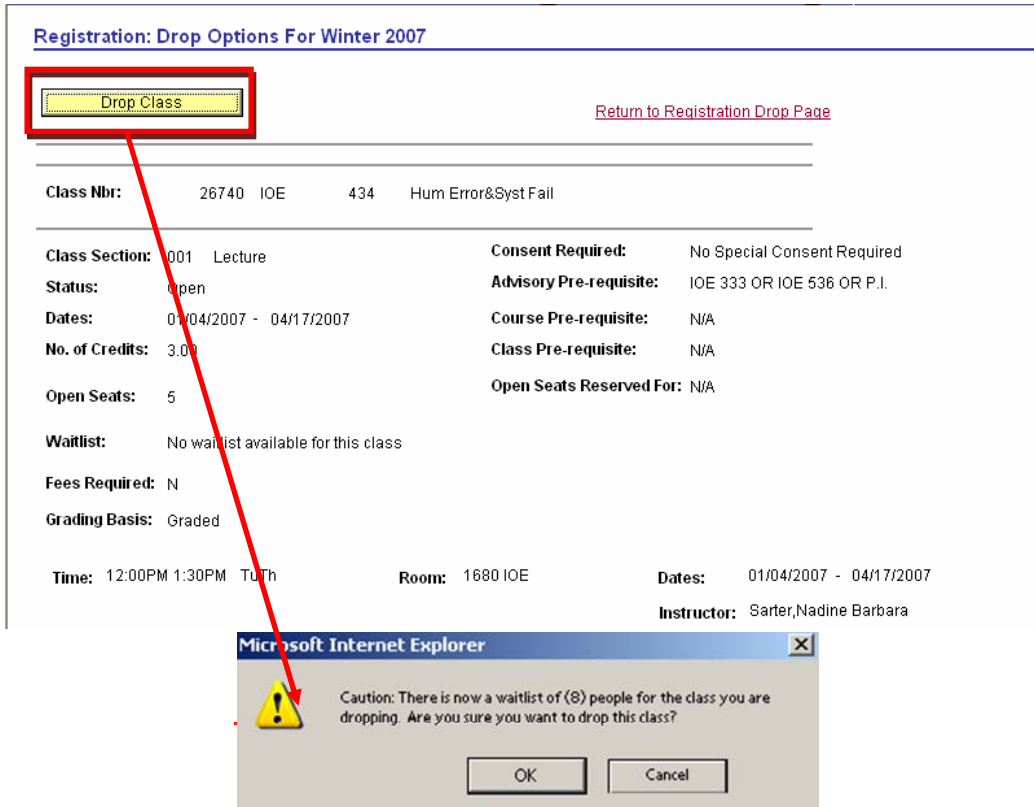


Figure 8B: Drop Class Page with Warning Message.

Problem Area #9: Poorly designed feedback dialogues

When searching for, adding, or dropping classes, the successful messages or error messages are all phrased in the system's language (i.e., database language) instead of the user's language. When a course has been added or dropped successfully, the user wants to know which course has being added or dropped so that they can react immediately if something unexpected has happened. Wolverine does poorly in providing this needed information, providing a number that only has meaning to the system and database, as shown in the red box in Figures 9A, 9B, and 9C. Currently, the user must look to his or her class schedule to ensure that they have added or dropped the correct class. If the system were to display more relevant information in the messages, the user could then skip this step of double-checking.

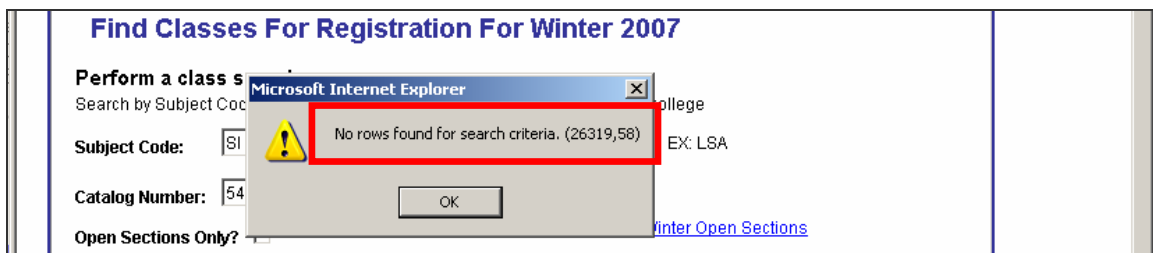


Figure 9A: Search Not Found Message.

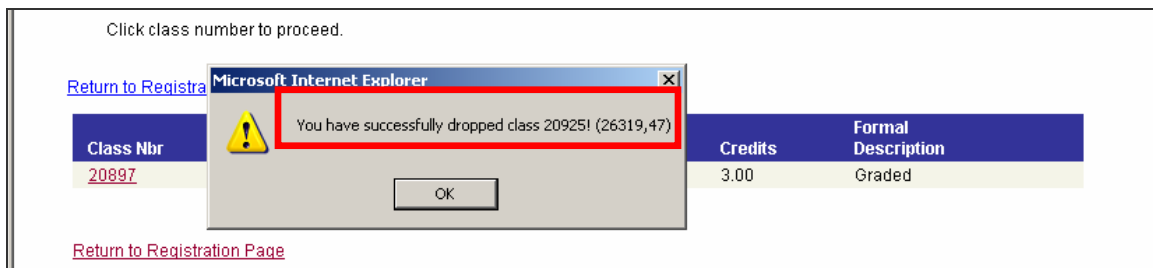


Figure 9B: Successful Dropped Class Message.

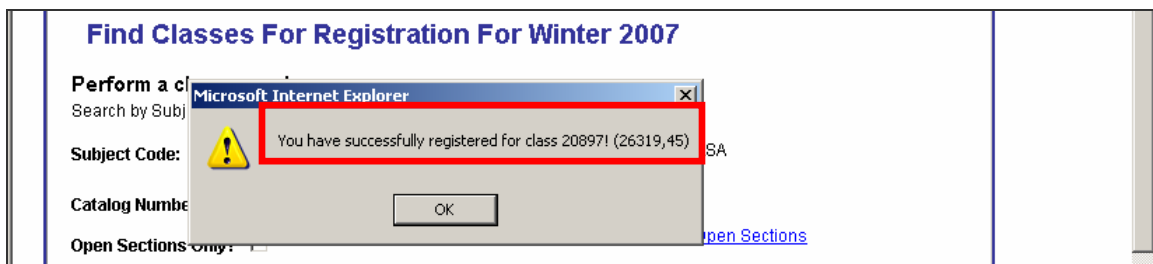


Figure 9C: Successful Added Class Message.

Proposed Solution(s) for #9: Poorly designed feedback dialogues

After adding a course or dropping a course, the user needs to know what course they have added/dropped. The messages should contain this information as shown in Figures 9D, 9E, and 9F, not just the numerical representations used by the database.



Figure 9D: "Search Not Found" Message (redesigned).

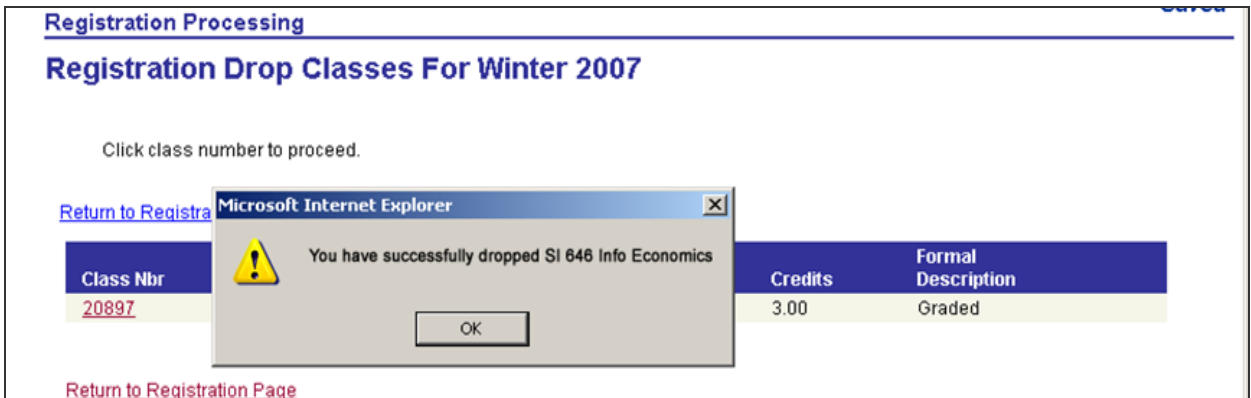


Figure 9E: Successful Dropped Class Message (redesigned).

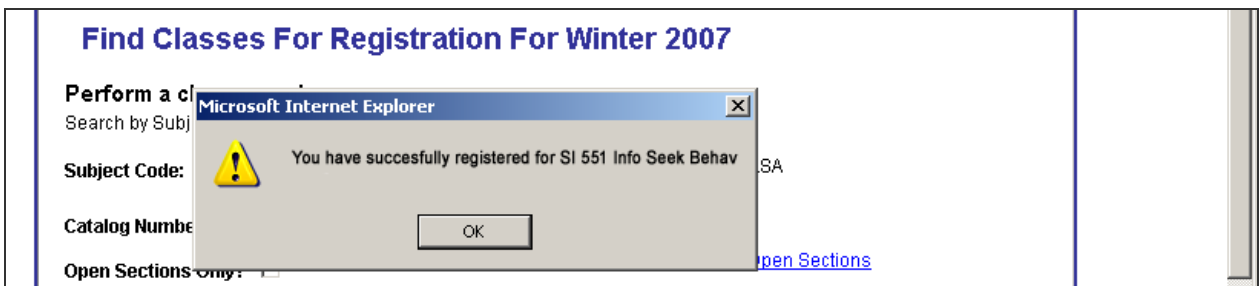


Figure 9F: Successful Added Class Message (redesigned).

Conclusion

From our evaluation of Wolverine, we identified some successful areas as well as some areas that can benefit from redesign. While the overall design of the site is simple and consistent, we found that this consistency can cause problems at times.

Based on our findings we conclude that provides a lot of useful information to its users. Nevertheless, this presentation often does not match how users think about the data. It may not fit the user's mental model adequately. For users to experience smooth browsing, the site needs to present relevant information in a manner that affords quick recognition and easy association with intended tasks. Otherwise, use of the site requires unnecessary cognitive exertion, and does not support users' actions or intentions well.

Therefore, we have three major recommendations that can be applied to a redesign of the site:

- Lowering the information access costs in critical areas and for certain features.
- Offering better perceptual cues (i.e., discriminability or situation awareness)
- Providing visual momentum throughout the site and related to certain features/screens or specific tasks

Our team has provided many design recommendations as a guideline for redesigning the site. We formulated these recommendations with the users in mind. Our redesigns are intended to help the users to find relevant information without having to navigate to multiple places. We feel that applying these recommendations can greatly reduce cognitive demands on most users and, therefore, may enhance any user's experience with the site.

References

Nielsen, J. (1993). *Usability Engineering*. San Francisco, CA: Morgan Kaufmann Publishers, Inc.

Shneiderman, B. (1998). *Designing the User Interface: Strategies for Effective Human-Computer Interaction*. Reading, MA: Addison-Wesley Educational Publishers Inc.

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Shneiderman's 8 Golden Rules

1. Strive for Consistency (e.g., terminology, color, layout, fonts)
2. Enable frequent users to use shortcuts (e.g., abbreviations, macros)
3. Design dialogs to yield closure (sequences of actions clearly organized with beginning, middle, end; gives sense of accomplishment, indicates ability to drop contingency plans, indicates that ready for next group of actions)
4. Offer informative feedback (e.g., clicking sounds; change in visual display)
5. Support error prevention and management (error detection, explanation, and recovery)
6. Permit easy reversal of actions (error tolerance)
7. Support internal locus of control (make person initiator, not responders to actions; avoid surprising system actions, difficulty with getting information, etc.)
8. Reduce short-term memory load (e.g., online access to abbreviations, codes)

Wickens's Principles of Display Design

- Perceptual Principles
 - Avoid absolute judgment limits
 - Top down processing
 - Redundancy gain
 - Discriminability
- Mental Model Principles
 - Principle of pictorial realism
 - Principle of the moving part
 - Ecological Interface Design
- Attention-Based Principles
 - Minimize information access costs
 - Proximity-compatibility principle
 - Principle of multiple resources
- Memory Principles
 - Principle of predictive aiding
 - Principle of knowledge in the world
 - Principle of consistency

Nielsen's Heuristics

- Visibility of system status
 - The system should always keep users informed about what is going on, through appropriate feedback within reasonable time
- Match between system and the real world
 - The system should speak the users' language, with words, phrases and concepts familiar to the user, rather than system-oriented terms
 - Follow real-world conventions, making information appear in a natural and logical order
- User control and freedom
 - Users often choose system functions by mistake and will need a clearly marked "emergency exit" to leave the unwanted state without having to go through an extended dialogue
 - Support undo and redo
- Consistency and standards
 - Users should not have to wonder whether different words, situations, or actions mean the same thing
 - Follow platform conventions
- Recognition rather than recall
 - Make objects, actions, and options visible. The user should not have to remember information from one part of the dialogue to another. Instructions for use of the system should be visible or easily retrievable whenever appropriate
- Aesthetic and minimalist design
 - Dialogues should not contain information which is irrelevant or rarely needed
 - Every extra unit of information in a dialogue competes with the relevant units of information and diminishes their relative visibility
- Help users recognize, diagnose, and recover from errors
 - Error messages should be expressed in plain language (no codes), precisely indicate the problem, and constructively suggest a solution.
- Help and documentation
 - Even though it is better if the system can be used without documentation, it may be necessary to provide help and documentation. Any such information should be easy to search, focused on the user's task, list concrete steps to be carried out, and not be too large



“Anne Frawley”

- **Attributes**
 - **First year grad student**
 - **Novice user, but tech-savvy**

- **Goals**
 - **Get familiarized with the system in the shortest time**
 - **Add classes and determine her course schedule**

- **Tasks**
 - **Browse/add classes**
 - **View class schedule**



“Bobby Human”

- **Attributes**
 - **Returning student pursuing Master’s degree**
 - **Familiar with the system**
 - **Already has a wish list of courses**

- **Goals**
 - **Get the maximum number of desired courses while mitigating the risk of losing classes he is currently in**

- **Tasks**
 - **Drop a 2nd choice course and add a 1st choice one without losing either**