

Heuristic Evaluation of MagicHW

1. Problem

Magic Homework is a tool that finds relevant course resources for specific terms/questions in an assignment, helps students learn from their mistakes, and guides students' exam preparation.

2. Violations Found

1. H4: Consistency and standards/ Severity 2/ Found by: A,C

- The Home and Assignments tabs have the same style header, but there is no header for Review and the header on Settings is a different size and color.
- Fix: Make all the tabs have the same style header as Home.

2. H8: Aesthetic and minimalist design/ Severity 3/ Found by: A,D

- The sidebar with the different tabs is always visible. This was likely done to make the prototype easier to interact with on Marvel, but the sidebar should be able to be opened and closed. Though, on the graded pset, it is closed. However you can still see and click on all the icons.
- Fix: Be able to open/close the sidebar instead of almost always having it open. When it's closed, just have the three lines icon in the corner instead of all the icons.

3. H8: Aesthetic and minimalist design/ Severity 1/ Found by: A

- On the Home page, it's hard to tell what the numbers in the yellow boxes represent because the text that says "Due", "Exam", and "Score" are too small and not prominent enough. Then looking at the text made me confused. "Due" and "Exam" are essentially conveying the same information: how much time you have left. Getting rid of the text entirely may actually make it less confusing because having the small labels makes it seem like they're going to have different meanings.
- Fix: Make the small text bigger or remove them entirely.

4. H4: Consistency and standards/ Severity 1/ Found by: A

- On a graded pset, the overall score is written as 88/100 whereas on the Assignments page for the specific class and the Home page under recently graded it's written as 88%.
- Fix: Make both 88/100

5. H4: Consistency and standards/ Severity 1/ Found by: A,D

- On a graded pset, the scores on the individual problems are color coded into red, yellow, and green. The same system isn't applied to the overall score at the top, which is always black.
- Fix: Make the overall score color coded as well.

6. H7. Flexibility and efficiency of use/ Severity 3/ Found by: A,C,D

- The review tab doesn't group the classes the way that the Assignments tab does. Is this because there's only an upcoming exam in one class so you're automatically taken there?
- Fix: Pick a class in the Review tab to then make a study guide.

7. H2. Match between system and the real world/ Severity 4/ Found by: A,B,C,D

- The Assignments and Review tabs must break down information for every class the student is in. It would be more user friendly to structure the app like Canvas (which students are used to using) and have a tab called Classes instead. Then for each class, there can be a section for assignments and a section for review.
- Fix: Group by class instead of by task for easier use.

8. H9: Recognize, diagnose, and recover from errors/Severity 2/Found by: A, B

- In the "Question 3" section of "PSET 1", it's not immediately clear that the text there is the student's incorrect solution.
- Fix: Perhaps it would be more helpful to have an option to see the correct worked out solution along side your incorrect annotated work.

9. H1. Visibility of system status/Severity 4 if user submits within app/ Found by: A

- It's unclear if a student completes and submits their homework assignments within the app or if they do it externally and just use the app to get help. They must need to respond to the questions within the app or else it wouldn't be able to predict how long it would take the student or track their answers and submissions. [Edit: later saw a previous pset for the class marked as submitted on the Assignment page for the CS class, so there definitely needs to be a button to submit the assignment.]
- Fix: On an assignment, show a response field beneath each question where the student can edit and save their response and a spot for them to submit the entire pset once it's complete.

10. H2. Match between system and the real world/Severity 3/Found by: A, B, C, D

- After loading pset3, the grey button at the top does not stand out to me as something I should click on for help. A: It looks hidden. B: Nothing about the shape or symbol is representative of its function.
- Fix: Maybe get rid of the button all together and just bold the possible search terms with links. Or make the button either all purple and have the yellow diamond appear when it's clicked or make the button a less intense version (less vibrant) when it's not activated so that it looks more clickable.

11. H10. Help and documentation/ Severity 2/ Found by: A

- The student can't request terms to have magic homework buttons added to. If the thing they're confused about isn't an option, they're just as stuck as they were before.

- Fix: Add way more terms to be magical and/or make it so that if a user clicks on a term there's a popup option that says "request magic".

12. H8. Aesthetic and minimalist design/ Severity 2/ Found by: A

- The magic homework pointer buttons cover up the text and make it hard to read the assignment, a problem that would be even worse if there were more of them (which I suspect would happen with AI).
- Fix: Highlight terms in yellow if they have a magic homework screen.

13. H5. Error prevention/ Severity 3/ Found by: A

- When the student clicks on a magic homework button, there's no place for them to mark if the resources that come up are actually correct and useful.
- Fix: Add a thumbs up/thumbs down component to the popup screen so that the AI can improve over time.

14. H4. Consistency and standards/ Severity 1/ Found by: A

- On the graded pset for a specific wrong problem, the box for Your Answer is a different size from the box for Correct Answer, which is right below it.
- Fix: Make the boxes the same dimensions.

15. H7. Flexibility and efficiency of use/ Severity 1/ Found by: A,D

- On the graded pset for a specific wrong problem, the box for Your Answer is purple and the box for Correct Answer is Green.
- Fix: Make the box for Your Answer the same color as the number of points you received (red, yellow, or green).

16. H3. User control and freedom/ Severity 3/ Found by: A,C

- Your app gives all the students other student's phone numbers, which is a privacy concern. It also puts the effort onto the student to reach out and ask for help personally.
- Fix: Make it so that you can message other students within the app or text a student without being given their phone number (like how contacting your Uber driver works). You could also think about those prewritten messages that can be sent right away: "Hey _____, it's _____ from Magic HW. The app suggests we should work together on problem 3 from the previous pset....etc."

17. H7. Flexibility and efficiency of use/ Severity 2/ Found by: A,D

- The student can get unlimited help from other students without having to volunteer time of their own. Discussing should be more of a reciprocal system.
- Fix: "Person A can help you understand Problem 3 if you can help them with Problem 2"

18. H4. Consistency and standards/ Severity 2/ Found by: A

- On the midterm study guide for Unit 3: The Brain, the videos don't have the same "Expand >" button that the other sections do.

- Fix: Add this button. Additionally, name the section “Course Material” and then have the videos and slides appear when the user clicks the newly added expand button.

19. H3. User control and freedom/ Severity 3/ Found by: A,D, C

- The user can remove sections from their study guide but they can't add new ones (or add back sections they may have accidentally deleted -> this would be easy to do since the expand and remove buttons are so close to each other). This functionality exists for the Past HW Problems section and should be duplicated here.
- Fix: Add an 'add' button. You could also consider a 'hide' button instead of 'remove'.

20. H1. Visibility of system status/ Severity 2/ Found by: A, B

- For the Midterm 1 study guide, the complete notification in the unit 1 introduction progress bar is hard to read with the green text on the dark purple background.
- Fix: Instead of putting “Est. Time Remaining N/A” above the progress bar, move the “Complete” to there.

21. H7. Flexibility and efficiency of use/ Severity 2/ Found by: A, B

- There's a notification “New!” next to the Recently Graded pset on the home screen. In general, there could be a problem seeing the new things when there are a lot of things on the home page.
- Fix: Only show a recently graded assignment in this section if there's a recently graded assignment that the student has not already seen. Or perhaps there could be a one-time popup for recently graded items.

22. H4. Consistency and standards/ Severity 1/ Found by: A,B,C,D

- On the Home page, the information conveyed in the yellow boxes isn't consistent. Some for time remaining and another for a grade. Different types of information is being displayed in the same format.
- Fix: Keep the yellow boxes only for upcoming due dates, as that is where the student wants their attention drawn.

23. H1. Visibility of system status/ Severity 2/ Found by: C

- I usually look to the sidebar to know what section of an app I'm in. I now see the “Home” at the top of the screen, but this was not my first take!
- Fix: Bold which section the user is currently in on the left hand sidebar.

24. H3. User control and freedom/ Severity 4/ Found by: B,C,D

- From home, clicked PSET3, and when I clicked back it took me to assignments instead of the home page. I was confused as to where I was/how to get back.
- Fix: Back directs to previously loaded page

25. H4. Consistency and standards/ Severity 1/ Found by: C

- Experience: The Review Section only generates study guides

→ Fix: Graded work can be reviewed in this section as well or rename it to Study Guides.

26. H2. Match between system and the real world/ Severity 3/ Found by: C

→ It'd be nice to know why the AI is recommending one unit over another. I think just saying "recommended" is vague enough that I would just work on whatever unit I felt like. I don't quite trust AI enough without some reasoning.

→ Add reasoning for why AI is recommending a certain unit. For example, is the unit material important moving forward, have you messed up a lot on that concept in the past, does it take you a long time? This would be useful information.

27. H6. Recognition rather than recall/ Severity 1/ Found by: D

→ I think that the "Assignments" and "Review" icons on the side bar are a little too similar. Also, in differentiating the two I tend to think that the "Review" icon might represent graded assignments as opposed to review.

→ Fix: change the review icon (I think the Assignments icon makes sense and should stay the same)

28. H2. Match between systems and recall/ Severity 3/ Found by: D

→ When I look at my recently graded problem set, I am given the option to expand. To me, I would expect the "Expand" option to stay on the same page and just show the whole problem, but in this case "Expand" takes me to an entirely new page.

→ Fix: I think part of what throws me off is the down arrow associated with it, so I think either making it actually just expand downward on the same page or else having the arrow to the right to make it clear that it will be opening a new page.

29. H8. Aesthetic and minimalist design/ Severity 2/ Found by: D

→ In the graded problem set, problems where the user did well are colored in green and problems where the user didn't do well are colored in red. As mentioned in class this week, it is generally good to avoid red/green in the app. Additionally, the color coding doesn't take into account the student's growth and progress. Seeing red even if they've improved a lot could be de-motivating.

→ Fix: Don't color-code the performance—just leave all the scores as black.

30. H4. Consistency and standards/ Severity 1/ Found by: B,D

→ In the CS 103 Assignments page, all of the assignments are lumped together, regardless of status (graded, submitted, unfinished).

→ Fix: Separate out assignments by their status, as is done on the home page.

31. H4. Consistency and standards/ Severity 3/ Found by: D, C, B

→ There are two buttons that look like back buttons, and they seem to appear/disappear randomly. One of them is actually a back button and one is to push the menu to the side.

→ Fix: Get rid of the left arrow that pushes the menu back in

32. H4. Consistency and standards/ Severity 1/ Found by: D

- When the menu is pulled out, all of the options are shifted down. This is because of the “Magic HW” logo that appears when the menu is out.
- Fix: When the menu is pushed in, make sure the menu options are in the same spot no matter whether the menu is in or out.

33. H7. Flexibility and efficiency of use/ Severity 2/ Found by: B

- On the welcome page (after clicking on “PSET 3”), it’s difficult to read the light grey on the white background. This contradicts the heuristic of making the app efficient to use (since it takes a lot of time to read).
- Fix would be making that text the same color as the darker grey text on the page.

34. H8. Aesthetic and minimalist design/ Severity 0/ Found by: B

- On multiple pages, the class title above the assignment is not centered. For the student with mild OCD like me, this keeps catching my attention. This violates the heuristic of minimalist design, since such an animation does not add value.
- Fix: Center it with respect to the bigger text below it.

35. H2. Match between system and the real world/ Severity 0/ Found by: B

- When users click on Past HW problems, they get a list of problems they did incorrectly, but it’s not ordered by degree of inaccuracy. I believe this could sometimes violate the heuristic of showing things in a natural and logical order. I would suspect students in some situations should first work through problems they struggled with more.
- Fix: Make a button to organize by this metric would be helpful.

36. H7. Flexibility and efficiency of use/ Severity 2/ Found by: B

- The popup window for the related content pins is difficult to read because of how small it is. The fullscreen button on the slides seems to suggest you wouldn’t be able to simultaneously watch the lecture. This is a violation of the heuristic to make the interaction efficient because it’s hard to get the information needed quickly.
- Fix: Making the whole popup larger would likely solve this issue.

37. H7. Flexibility and efficiency of use/ Severity 1/ Found by: B

- It takes many clicks to get to one of the app’s core features: connecting with students studying the same material. This is a violation of the heuristic to “allow users to tailor frequent actions”.
- Fix: Perhaps a button in the menu bar that lets you go directly to this feature would be helpful.

3. Summary of Violations

Category	# Viol. (sev 0)	# Viol. (sev 1)	# Viol. (sev 2)	# Viol. (sev 3)	# Viol. (sev 4)	# Viol. (total)
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H1: Visibility of Status			2		1	3
H2: Match Sys & World	1			3	1	5
H3: User Control				2	1	3
H4: Consistency		7	2	1		10
H5: Error Prevention				1		1
H6: Recognition not Recall		1				1
H7: Efficiency of Use		2	4	1		7
H8: Minimalist Design	1	1	2	1		5
H9: Help Users with Errors			1			1
H10: Documentation			1			1
Total Violations by Severity	2	11	12	9	3	37
Note: check your answer for the green box by making sure the sum of the last column is equal to the sum of the last row (not including the green box)						

4. Evaluation Statistics

Severity / Evaluator	Evaluator A	Evaluator B	Evaluator C	Evaluator D
sev. 0	0/2=0%	2/2 = 100%	0/2=0%	0/2=0%
sev. 1	6/11 = 54%	3/11 = 27%	2/11 = 18%	6/11 = 54%
sev. 2	8/12=67%	5/12 = 42%	2/12 = 17%	2/12 = 17%
sev. 3	6/9=67%	2/9 = 22%	6/9 = 67%	6/9 = 67%
sev. 4	2/3 = 67%	2/3 = 67%	2/3 = 67%	2/3 = 67%
total (sev. 3 & 4)	8	4	8	8
total (all severity levels)	22	14	12	16

*Note that the bottom rows are *not* calculated by adding the numbers above it.

5. Summary Recommendations

Overall, we really enjoyed using your prototype and were really impressed.

- To improve the usability, we think your app would benefit from grouping by classes instead of by task. Since this is the format that most students are already used to using on tools like Canvas and Gradescope, it would make for an easier transition to Magic Homework. Additionally, it would make your app much easier to navigate and give it a simpler structure. This would be beneficial because we felt the materials were a little scattered and that there was a possibility of missing something important from another page. Since one of the selling points for your idea is that it compiles material from many different places into one organized location, this is especially important to get right.
- The magic button on the in-progress assignment is the selling point of your product, and we think it could be improved if you:
 - ◆ Put an indicator arrow by it that said “Click me for help!” so that students who have never clicked it before know what it does and are prompted to try it out.
 - ◆ Change the coloring of the button when it’s not pressed to something that looks more like a button than greyed out.
 - ◆ Consider marking the Magic Homework pins in a way that doesn’t cover up the text and maintains readability of the assignment, perhaps by bolding or highlighting the key terms.
 - ◆ Added a feature where the teacher can see how many students clicked on what magic homework pins so they can see where they need to improve their lectures.
 - ◆ Added a feature where students can give a thumbs up or thumbs down to the content the magic pin produced so that you have a measure of how useful the pulled material is.
- To improve consistency, we’d recommend you look out for:
 - ◆ Maintaining headers across all your pages
 - ◆ Choosing a standard way to display grades (raw vs percent)
 - ◆ Color coding overall grades the way you color code the individual problems (or choosing to do away with this color-coding entirely and stick with black)
 - ◆ Ensuring all text is legible and easy to read (color choices, text size, etc)
 - ◆ Ensuring that the back button always takes the user to the previous screen that they were on.
- Finally, to improve efficiency of use, we recommend you make sure that your icons are more distinguishable:
 - ◆ The back button & button that collapses the menu system
 - ◆ The Assignments & Review icons

We had a lot of fun playing with your prototype and getting a deeper understanding of your project/product and are looking forward to seeing the final result!

Severity Ratings

- 0 - don't agree that this is a usability problem
- 1 - cosmetic problem
- 2 - minor usability problem
- 3 - major usability problem; important to fix
- 4 - usability catastrophe; imperative to fix

Heuristics

H1: Visibility of System Status

- Keep users informed about what is going on

H2: Match Between System & Real World

- Speak the users' language
- Follow real world conventions

H3: User Control & Freedom

- "Exits" for mistaken choices, undo, redo
- Don't force down fixed paths

H4: Consistency & Standards

H5: Error Prevention

H6: Recognition Rather Than Recall

- Make objects, actions, options, & directions visible or easily retrievable

H7: Flexibility & Efficiency of Use

- Accelerators for experts (e.g., gestures, kb shortcuts)
- Allow users to tailor frequent actions (e.g., macros)

H8: Aesthetic & Minimalist Design

- No irrelevant information in dialogues

H9: Help Users Recognize, Diagnose, & Recover from Errors

- Error messages in plain language
- Precisely indicate the problem
- Constructively suggest a solution

H10: Help & Documentation

- Easy to search
- Focused on the user's task
- List concrete steps to carry out
- Not too large