Al - Imam university
Computer science
College of Computer and
Information Sciences

كلية علوم الحاسب والمعلومات
College of Computer and Information Sciences

HCI PROJECT

CS351

Instructor:

Dr. Abeer AL-Nafijan

Prepared by:

Sara Almashharawi 440028560
Aliah Alhameed 440020584
Noor Almasry 440027219

Section 371

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Task 1. Interface Examples :

In this section, we gave examples of good/bad interfaces and show how it effect the usability.

1.1 Good interfaces

- **1.1.1 Meed express vending machine:**

At IMBS university, I found a meed vending machine. There was no user manual on the machine. However, when I look at the machine, I knew how to use it since the interface was clear. There is numbered step. So, I knew these numbers are the steps to follow. I look at the items place I found numbers below each item so I know the string number is the ID of the item and the small number is the price. First, there was a group of elements sounded with the number one, from the appearance I know there are cash acceptor and coin acceptor. I insert my money and then immediately display the amount I have inserted into the cash acceptor. I moved to the second group, there was a numeric keypad. Immediately I know I have to press the number of the item I want and then press ok. The adjust belt starts to push the Item I select and drop it into the pickup box. I look at the display again, and I notice the amount I inserted discount by the item I select. Then I open the box and found the item and take it. There is a button to return the remaining money on the numeric keypad. the money will exit from group number 3. I know from its appearance it will return coins. However, there is a poster on the machine that says the remaining money will not be returned. So, I know even if I press return it will not return the money.

Usability principle	Subprinciple	Sub-subprinciple	Effect in usability
learnability	predictability	Operation visibility	Increase
	synthesizability	Immediate honesty	Increase
	familiarity	affordance	Increase
Flexibility	Dialog-initiative	User preemptive	Increase
Robustness	Responsiveness	Response time	Increase
	Task conformance	Task adequacy	Increase

- **1.1.2 McDonald's Self-Order machine:**

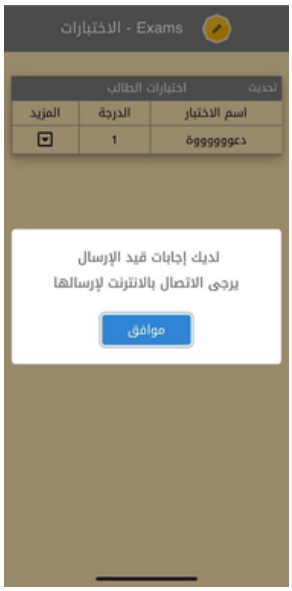
When I visited McDonald's, I wanted to order food, and I found a self-ordering machine. There was no user manual for the communication device, however, when I looked at the device I knew how to use it because the interface was straightforward. First when I pressed the screen by touch, an interface appeared to me that I knew I should proceed with. It contained an option: Do I want food inside or outside the restaurant, after that a list of food items and meals appeared, then after I chose the meal, a list of extras options appeared and I chose what I wanted, then the order quantity was determined, then I clicked Add to order and thus the order was added Then complete it by pressing Done. Secondly, after completing the order, a list of payment methods appeared. Do I want it at the counter or here by card with a credit card Payment methods or Visa When I looked at the machine there was a payment machine and that the payment was from this place and after choosing the payment method and completing the payment, when I looked at the machine and it had a port and I knew that this port is for printing Bill. After the order number appeared on the screen, the invoice was printed, so the ordering method was clear and easy.

Usability principle	Subprinciple	Sub-subprinciple	Effect in usability
learnability	Familiarity	Affordance	Increase
	Predictability	Operation visibility	Increase
Flexibility	Dialog initiative	User pre-emptive	Increase
	Substitutivity	Input , output substitutivity	Increase
Robustness	Observability	Operation visibility	Increase
	Observability	Reachability	Increase
	Recoverability	Backward	Increase
	Task conformance	Task adequacy	Increase

1.2 Bad interfaces

- **1.2.1 Testing application " الاختبارات " :**

One of the applications that my teachers used to test us online during the covid-19 was “الاختبارات” app. When I first used this app, I was very confused about how to use it because it wasn’t very clear to me, and I wanted to take my test, so I was very anxious, I did not know what to do. When, the teacher sent the link of the test, even though I downloaded the app, when I open the link, I still get the window for downloading the app. I notice “ اضغط هنا لتحميل الاختبار “ label, so I click and nothing happen. I don’t know if the exam is downloaded or not and where I can found it. I go back to the app to see what happen, I see the test is appears in the list of exams. my anxiety increased since there are many steps to reach the exam. When I click in the exam , it appears big window to tell you to turn internet off this is also confusing for me as a new user of the app who does not know how to use it. So I turn it off , and press the test link , again! . finally it is opened now!. I start answering the question, I face a hard question that need think. I could not think because I was afraid to auto closing of the test. I don’t know how much time I took and how much spent for me. When I finish the test to send it , appears window says you must turn on the internet, so I opened it but I still on the same page. I don’t know if I must click submit button again or not. However, I click it again. When I do that I don’t get any notification that the test was submitted, and I get worried that my test is lost.

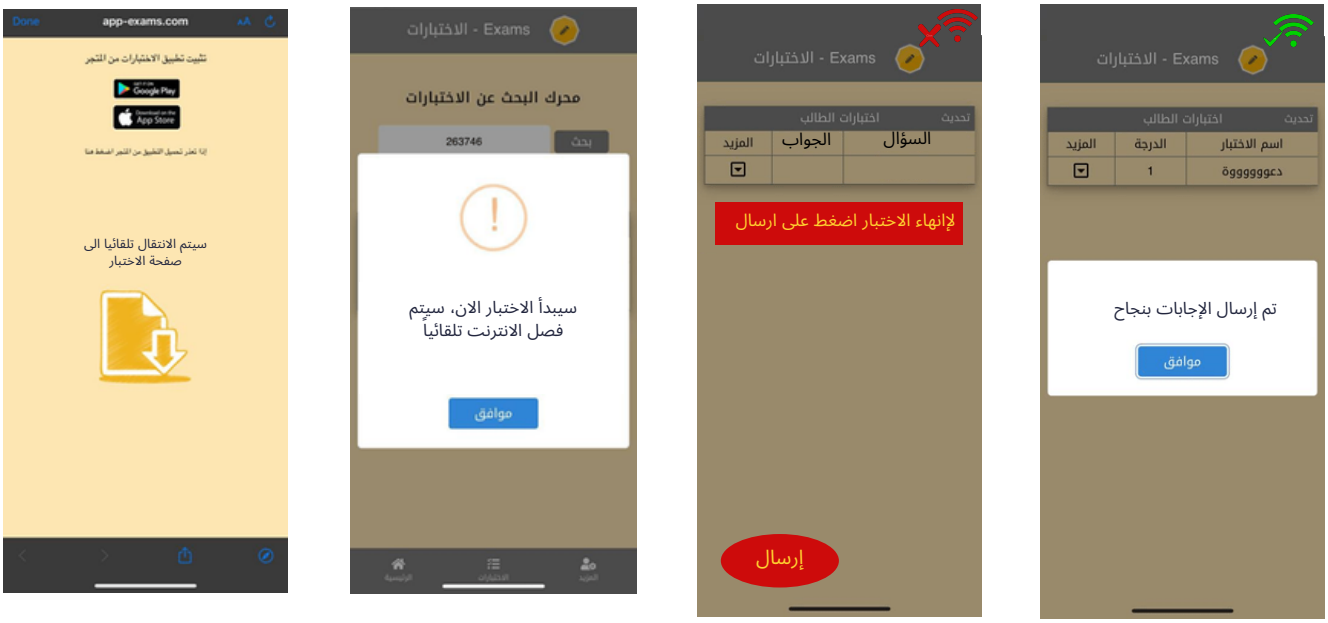


Usability principle	Subprinciple	Sub-subprinciple	Effect in usability
learnability	Synthesizability	Eventual honesty	Decrease
	Predictability	Operation visibility	Decrease
Flexibility	Dialog initiative	System pre-emptive	Decrease
	Task migratability		Decrease
Robustness	Responsiveness	Response time	Decrease
	Task conformance	Task completeness	Decrease
	Task conformance	Task adequacy	Decrease

1.2.1.1 Proposed Interface for Testing application :

After we have seen the problems of the interface and the usability principles that have been affected by it we have suggested some solutions to fix them:

1. When the user opens the link of the test the link should automatically take them to the test without asking them to do anything.
2. When the user enter the test they should get a warning message that tells them that the test will start and the internet will be automatically turned off.
3. When a user finish the test the questions and answers should be clear to them so they make sure that they answer all the questions and the there should be a clear button that the user press to send the test.
4. When a user send the test they should get a message that tells them the internet was reconnected automatically and that the test was successfully sent .

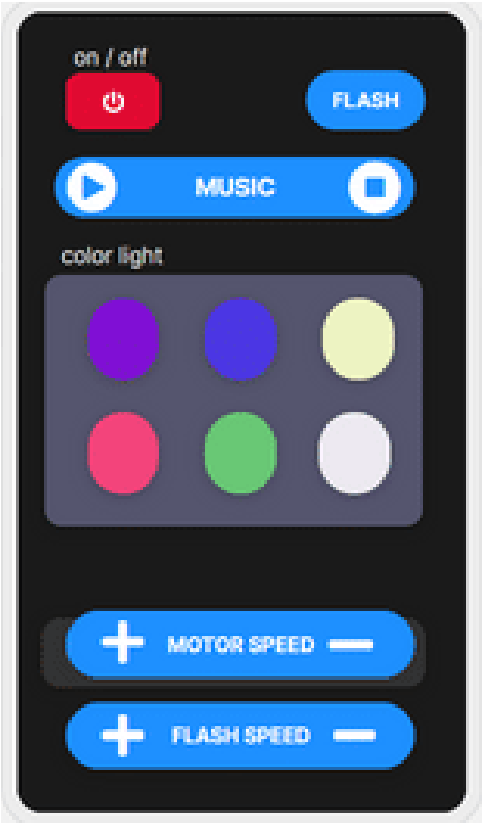


- **1.2.2 Laser Light Remote Control :**

I have bought a LED laser light that also has a speaker. From the package, I know you can choose the appropriate light. It has a remote control to control the light and sound. I want to turn on the object, but I confused. There are two buttons to turn the object on. From my experience I suppose that when I press the left one , the object will be open. But , I wonder what is the purpose of the right button since it has on/off next to it. After I press left button, the lights turn on with green color. I want to choose blue color, but I don't know which button I have to press. So , I started to press randomly buttons. When I press on A1 I notice the color changed to red. I keep pressing on the sequence of A until I reach the blue color. On the remote control, there was buttons with plus and minus signs (+, -) that has two labels flash speed and motor speed. So, I confused which function these buttons will do. Also, there are three music buttons. All three buttons work the same. I don't know what the purpose of it to be repeated. If I want to select specific color I keep pressing on A's until I reach the color, this is very annoying. I would rather to label each button with it corresponding color. So, this remote is not clear and it is necessary to take time to understand the buttons and their functions.

Usability principle	Subprinciple	Sub-subprinciple	Effect in usability
learnability	Familiarity	Guessability	Decrease
	Predictability	Operation visibility	Decrease
Robustness	Observability	Operation visibility	Decrease
	Task conformance	Task adequacy	Decrease

1.2.2.1 Proposed interface for Laser Light Remote Control :



After identifying the interface of laser light remote control and classifying it as a bad interface, we designed an interface to solve the problems that caused usability problems:

1- as we converted the play buttons to one instead of two.

2- the music button we made it one instead of three buttons and we combined with it a button to stop and play the music.

3- as we explained The light-colored buttons instead of the symbols A1, A2...

4- As for the flash speed and motor speed buttons, each button was separated and made with its own plus and minus sign (+,-) .

after designing this interface, the usability of the user increased as it became a clear interface that can be The user understands it and knows how to deal with it, and by looking at the symbols and the interface, he can predict the operations he will perform.

Task 2. Usability Expert Analysis Evaluation:

In this section, we evaluate system service using usability expert analysis evaluation techniques.

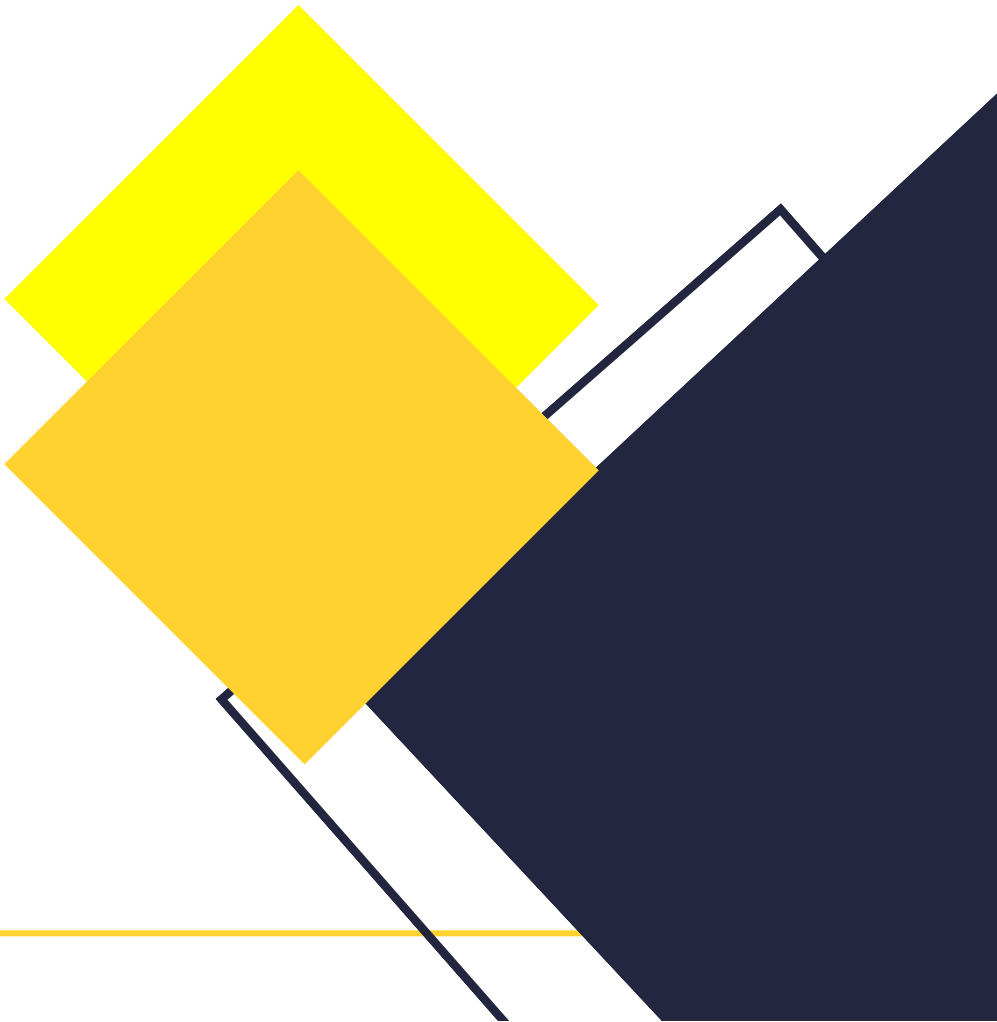
- **Backboard System Specification:**

The backboard is an online learning system. It develops to support ease of learning via supporting virtual classes, communicating with the instructor, and submitting projects. The need for it arises during the COVID-19 pandemic. Since going to university to present lectures was impossible. Now, the blackboard has been an essential system in the life of any academic student.
The important tasks that blackboard offers are submitting projects, viewing available courses, and attend in virtual classroom. In this paper, we will evaluate the usability using two usability expert analysis evaluation techniques for each of the previous tasks:
1. Cognitive walkthrough
2. Heuristic evaluation
3. Model-based evaluation
4. Using previous studies in the evaluation

TASKS & EXPERT ANALYSIS EVALUATION TECHNIQUE USED

"Submitting Project" task:	• Cognitive walkthrough evaluation technique. • Heuristic evaluation technique.
"View Courses" task:	• Cognitive walkthrough evaluation technique. • Model-based evaluation technique.
"Attend Virtual Classroom" task:	• Heuristic evaluation technique. • Model-based evaluation technique.

2.1 "View Courses" Task



2.1.1 Cognitive walkthrough evaluation technique:

Phase 1: Collect information about the system,users,and task :

- User: We assume that the users are IMBS students and are familiar with the system.
- Task: View available courses.
- System: the system is for managing learning and contain multiple courses with menu options (content, course info, virtual classroom, ...).

Specifying action sequence for the task in terms of User Action (UA) and System View and Response (SD):
UA1: Open the IMBS Blackboard site.
SD1 : System open Login window.
UA2 : User enter ID and password.
SD2 : system verifies the ID and password and then opens the home page.
UA3: user clicks on the "courses " icon on the top of the home page.
SD3: Shows the list of registered courses for the student.
UA4: user choose cs351 course.
SD4: System appears CS351 course display.

Phase 2: Step through the action sequence and answer the four questions.

For each US , we answer these questions:
Q1: Is the effect of the action the same as the user's goal at that point?
Q2: Will the user see that the action is available? (visibility of the action)
Q3: Once the user has found the correct action, will he/she know it is the one he/she needs? (meaning and effect of the action)
Q4: After the action is taken, will the user understand the feedback he/she gets?

UA1: Open the IMBS Blackboard site.

Q1: Is the effect of the action the same as the user's goal at that point ?
Yes, when I enter https://lms.imamu.edu.sa/ the login page will appear.

Q2: Will the user see that the action is available? (visibility of the action)
Yes, I can see a field for entering the ID and a field for the password and the log in button .

Q3: Once the user has found the correct action, will he/she know it is the one he/she needs? (meaning and effect of the action)
Yes, as soon as you click on the URL the log in page will open.

Q4: After the action is taken, will the user understand the feedback he/she gets?
Once the action is taken, the login page will appear and the user is supposed to type in the fields and click on the log in button.

UA2: User enter ID and password.

Q1: Is the effect of the action the same as the user's goal at that point ?
Yes, when the ID and password are entered correctly, it is entered on the home page.

Q2: Will the user see that the action is available? (visibility of the action)
Yes, I can see the home page if the ID and password are entered correctly.

Q3: Once the user has found the correct action, will he/she know it is the one he/she needs? (meaning and effect of the action)
Yes, the page home will appear in front of it.

Q4: After the action is taken, will the user understand the feedback he/she gets?
Once the action is taken, the home page with its courses, tools and more will appear on the screen and the user will choose the action he wants from this page.

UA3: user clicks on the “ courses “ icon on the top of the home page.

Q1: Is the effect of the action the same as the user's goal at that point ?
Yes, when you click the Courses button at the top of the homepage, a list of all the courses registered for that semester will appear.

Q2: Will the user see that the action is available? (visibility of the action)
Yes, I can see my courses in the list with course names.

Q3: Once the user has found the correct action, will he/she know it is the one he/she needs? (meaning and effect of the action)
Yes, if a list of course names appears to him, it is the required procedure.

Q4: After the action is taken, will the user understand the feedback he/she gets?
Once action is taken, the screen will show a list of course names. The user is supposed to click on the name of the course he wants.

UA4: user choose CS351 course.

Q1: Is the effect of the action the same as the user's goal at that point ?
Yes, when you click on the cs351 course button, a list will appear containing the course contents and information.

Q2: Will the user see that the action is available? (visibility of the action)
Yes, I can see the course contents when I press the cs351 course button.

Q3: Once the user has found the correct action, will he/she know it is the one he/she needs? (meaning and effect of the action)
Yes, if a list appears containing the contents and information of the course, this is the required procedure.

Q4: After the action is taken, will the user understand the feedback he/she gets?
Once the action is taken, a list will appear containing the course contents and information (instructor info, my grades, tools, etc.). The user is supposed to click on the button of the service or action he wants.

2.1.2 Model-based Evaluation:

Using GOMS model for evaluation

- Goal : viewing CS351 course.
- Operator: press CS351 course button.
- Method: 2 sub goal , using courses or my courses,
- Selection rules :

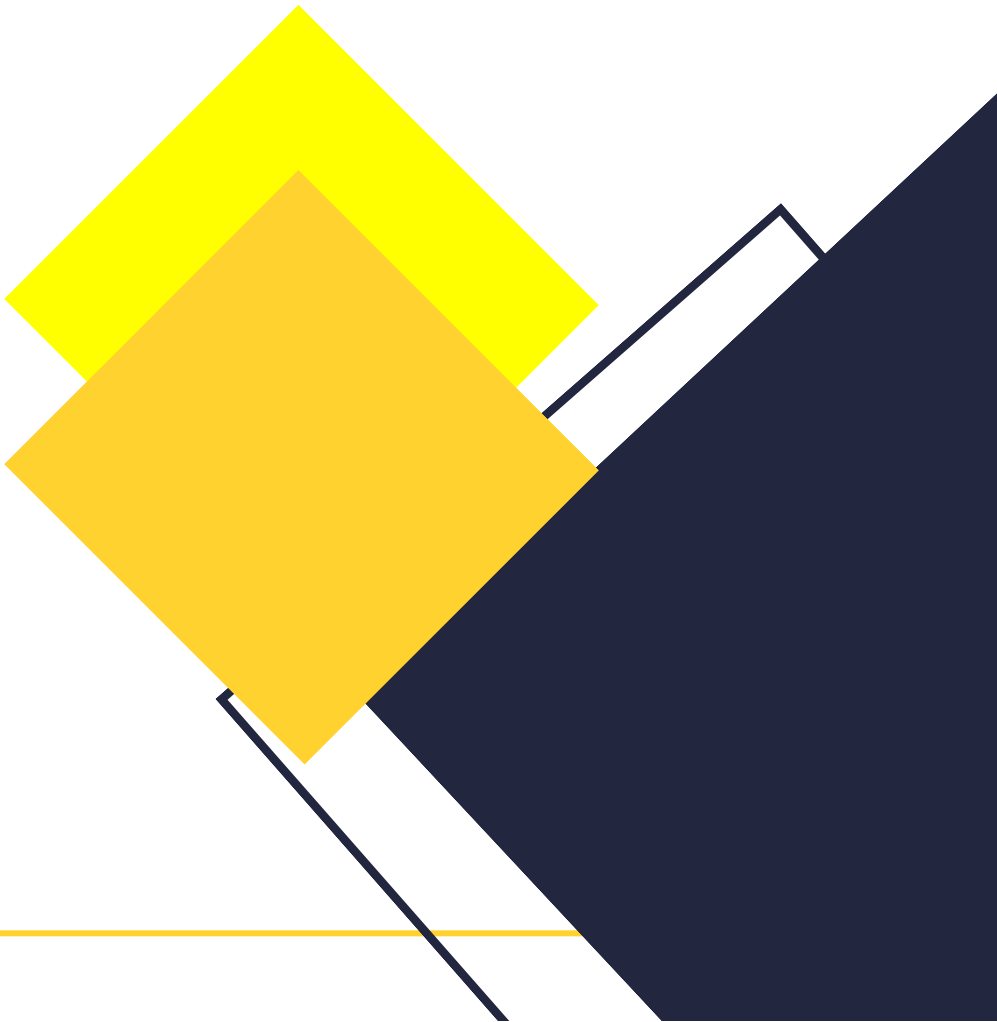
GOAL : VIEWING CS351 COURSE
[select

GOAL : USE-MY-COURSES-METHOD
MOVE-MOUSE-TO-HOME-PAGE
MOVE-MOUSE-TO-DOWN
CLICK-OVER-MY-COURSES-BUTTON
MOVE-MOUSE-TO-CS351-COURSE
PRESS- CS351-COURSE -BUTTON
GOAL : USE-COURSES-METHOD
MOVE-MOUSE-TO-HOME-PAGE
MOVE-MOUSE-TO-RIGHT
MOVE-MOUSE-TO-COURSES -BUTTON
PRESS-COURSES-BUTTON
MOVE-MOUSE-TO-CS351-COURSE
PRESS-CS351-COURSE -BUTTON
]

2.1.3 Summary of Task:

After evaluating the viewing available courses interface, it turned out that it is a good interface because it supports many principles of usability , as it can be accessed in two ways, either through “my courses” on the home page or through “courses”, both of which display the registered courses. The user can access his courses easily as he sees it in front of him on the home page, and this is from learnability, as the user can predict the location of the courses when logging in. The entry through “my courses” is distinguished by displaying the important advertisements for the course that the teacher publishes to students and showing the advertisements that the student did not see in bold to alert the student and will not change until he sees it, this is from persistence and it supports robustness, specifically observability. As for the way courses are displayed via “courses”, the courses can be clearly displayed in a drop-down list, and the drop-down list provides the user with the ability to select different options from one drop-down list, the student chooses the course he wants to access easily And exit from it to move to another course easily, and this is from reachability, and it supports robustness in particular, and also when entering To the required course, for example, CS351 shows the arrangements of icons and key features. The page is clear and concise and gives the user a quick overview of the tasks that can be performed and the current state of the system. This is one of the principles of Browsability and it supports robustness in particular. Observability So the design of the viewing courses available includes elements of usability, accessibility, interactive use of interface elements and functions Navigation elements to access the registered courses.

2.2 "Submitting Project" Task



2.2.1 Cognitive walkthrough evaluation technique:

After viewing the course, I can submit the project.

Phase 1: Collect information about the user, system, and task.

- User: we assume the users are students of IMBS university and they are familiar with the system.
- Task: submitting course project as an attached pdf file.
- System: the system is for managing learning and contain multiple courses with menu options (content, course info, virtual classroom, ...).

Specifying action sequence for the task in terms of user action (UA) and system feedback (SD).
US1: user clicks on the content section icon.
SD1: system open content page.
US2: user clicks on the project icon.
SD2: system open project page.
US3: user clicks on the browse local file icon.
SD3: system open widow of my computer file.
US4: user chooses a file and presses open.
SD4: system load the file, color the browse local file icon in blue, and display the file name with the link title.
US5: user click submits button.
SD5: system open the page of success submission and send a confirmation number and shows assignment details.

Phase 2: Step through the action sequence and answer the four questions.

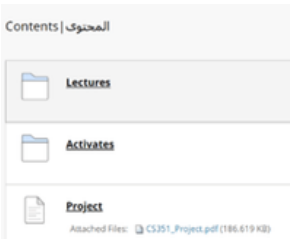
For each US , we answer these questions:
Q1: Is the effect of the action the same as the user's goal at that point?
Q2: Will the user see that the action is available? (visibility of the action)
Q3: Once the user has found the correct action, will he/she know it is the one he/she needs? (meaning and effect of the action)
Q4: After the action is taken, will the user understand the feedback he/she gets?

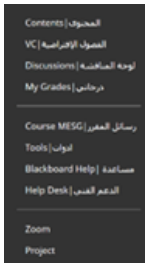
US1: user clicks on the content section icon.

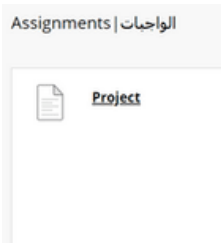
Q1: Is the effect of the action the same as the user's goal at that point?
Yes, when I click the content section icon, it appears all the content of the course.

Q2: Will the user see that the action is available? (visibility of the action)
Yes, I can see content label visible in the left most menu.

Q3: Once the user has found the correct action, will he/she know it is the one he/she needs? (meaning and effect of the action)
No, the user may not find the project submission, it could be in any place other than content.







Here it is in the content. Here it is in the course menu. Here it is in the assignment section.

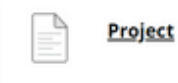
Q4: After the action is taken, will the user understand the feedback he/she gets?
Once the action is taken, the display appears all the content of the course (slides, assignments, activity) , assuming the submission is in content section and the user notice it.

US2: user clicks on the project icon.

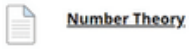
Q1: Is the effect of the action the same as the user's goal at that point?
Yes, when I click on the project icon, the submission page will appear.

Q2: Will the user see that the action is available? (visibility of the action)
Yes, I can see icons with label that I can click, and I see the project label.

Q3: Once the user has found the correct action, will he/she know it is the one he/she needs? (meaning and effect of the action)
No, because all the labels have same icon - maybe some teacher post 2 files for project specification and project submission naming them both " project " - .



This section is for submission.



This is a chapter slides
(has same icon for submission)

This is the project specification
(has same label for submission)

Q4: After the action is taken, will the user understand the feedback he/she gets?
Once the action is taken, the display appears project submission page clearly with understood heading include assignment information assuming that the user click the correct label.

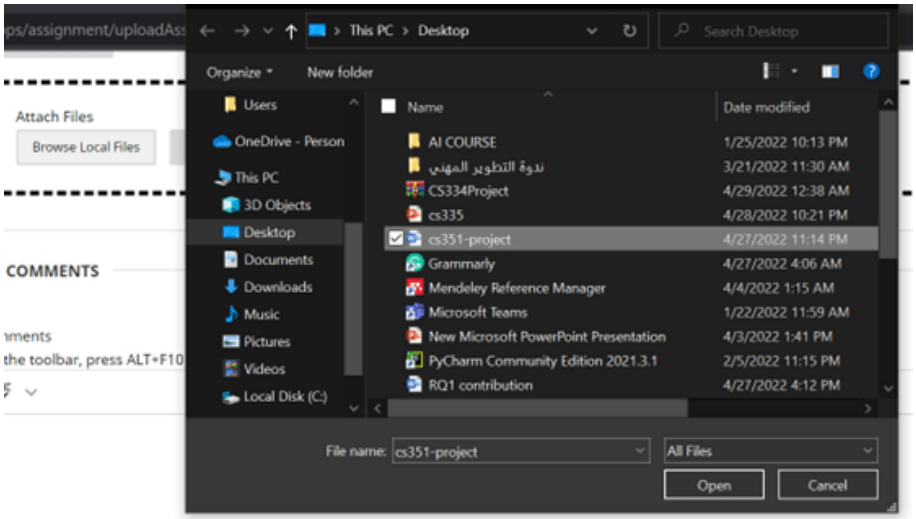
US3: user clicks on the browse local file icon.

Q1: Is the effect of the action the same as the user's goal at that point?
Yes, when I click on " browse local file " , all the local file in my PC appears including the file I want to submit.

Q2: Will the user see that the action is available? (visibility of the action)
Yes, when I page down ,I can clearly see the browse local file button as I'm familiar with .

Q3: Once the user has found the correct action, will he/she know it is the one he/she needs? (meaning and effect of the action)
Yes, its clearly labeled and only my local file will appear in the window.

Q4: After the action is taken, will the user understand the feedback he/she gets?
Yes, Once the action is taken, the name appears in the name bar for the window.



US4: user chooses a file and presses open.

Q1: Is the effect of the action the same as the user's goal at that point?
Yes, when I open the file, it will be uploaded in the display.

Q2: Will the user see that the action is available? (visibility of the action)
Yes, I can clearly see the open button I can click .

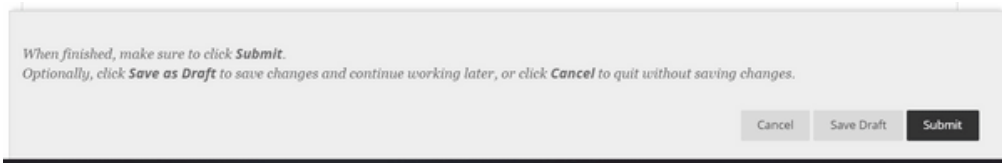
Q3: Once the user has found the correct action, will he/she know it is the one he/she needs? (meaning and effect of the action)
Yes, I can only choose a file. Nothing will happen if I press open with out choosing file.

Q4: After the action is taken, will the user understand the feedback he/she gets?
Yes, Once the action is taken, the system display the selected file and browse file button will have a blue line.

US5: user click submit button.

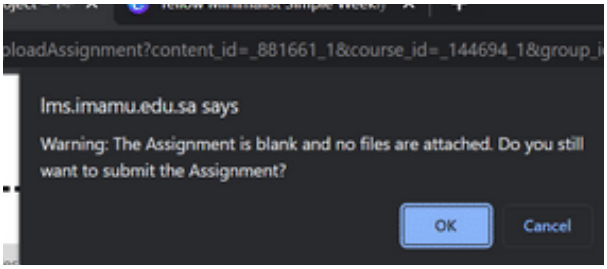
Q1: Is the effect of the action the same as the user's goal at that point?
Yes , if I click submit button, the main screen change and display conformation code and assignment info.

Q2: Will the user see that the action is available? (visibility of the action)
Yes, it is labeled submit and stays in the display as you go up and down.



Q3: Once the user has found the correct action, will he/she know it is the one he/she needs? (meaning and effect of the action)
Yes, if I click it, it will submit.

Q4: After the action is taken, will the user understand the feedback he/she gets?
Yes, Once the action is taken, the display change and display conformation code and assignment info. If any wrong in uploading the file the system appears warning window and will not submit.



2.2.2 Heuristic evaluation technique:

According to Nielsen Norman Group site (https://www.nngroup.com/) , says that the evaluation should has at least tree evaluators. So, we conduct a survey between us (group of 3 evaluator) and rate "submission project" task.

To conduct the Heuristic evaluation method , we follow these steps : (from adamford site - https://adamfard.com/blog/heuristic-evaluation-)

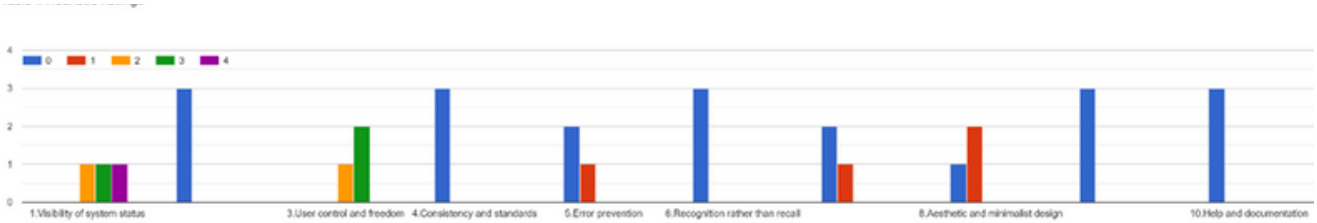
Step 1: Define the scope of your evaluation.
We will test submitting project task in blackboard.

Step 2: Know your end-user.
The users are students at IMBS university, some are familiar with submitting and other are not.

Step 3: Choose your set of heuristics.
We will choose Nielsen's Ten Heuristics .

Step 4: Set up an evaluation system and identify issues.
We did a survey that shared only between the evaluators : Sara, Aliah, and Noor :
https://forms.gle/gvjxAGUJBs3RFqWq6
We rate the system as :
0 = I don't agree that this is a usability problem at all
1 = Cosmetic problem only: need not be fixed unless extra time is available on project
2 = Minor usability problem: fixing this should be given low priority
3 = Major usability problem: important to fix, so should be given high priority
4 = Usability catastrophe: imperative to fix this before product can be released

Step 5: Analyze and summarize findings.
Result is :



As we notice there are principles has usability issues:

- **Sara :**

Principle 1:Visibility of system status: (rate: 3)
when click on submit button, nothing indicate that it is in progress.
Principle 3:User control and freedom: (rate:2)
if submitting the project before deadline , you can't delet it and resubmit new one even if there is time for the end of duration.
Principle 7:Flexibility and efficiency of use: (rate:2)
there are around 4 ways to select the file or write text, user could think he must choose it all. it should be drop down menu that present submitting way and uer choose the way he want,
Principle 8:Aesthetic and minimalist design:(rate: 2)
there is section " Add Comment" , this section is very rarely to use , user may think it is required .

- **Noor:**

Principle 1:Visibility of system status: (rate: 2)
No progress bar appears in submitting.
Principle 3:User control and freedom: (rate:3)
should be fix , because if I submit wrong file I cannot resubmit the correct.

- **Aliah:**

Principle 1:Visibility of system status: (rate: 4)
submit button has to be repair to indicate it is working.
Principle 3:User control and freedom: (rate:3)
user should control submitting before end of duration.
Principle 5:Error prevention: (rate:2)
if click on submit, even if no file attached only confirmation massage appear. it should prevent submit when no file.
Principle 8:Aesthetic and minimalist design:(rate: 2)
it has too section not necessary.

So, we agree that “submitting project” is matched with:
Principle2: Match between system and the real world:(rate:0)
Since its term is understood and meaningful.
Principle4: Consistency and standards : (rate:0)
It design has external consistency , same as any platform for same function.
Principle6: Recognition rather than recall:(rate:0)
You don’t have to remember any information, all the information is visible.
Principle9: Help users recognize, diagnose, and recover from errors :(rate:0)
If an error happen , the system indicate the error and provide solution.
Principle10:Help and documentation:(rate:0)
It provides tutorial in how to submit and document each step.

Percentage of the usability rate :

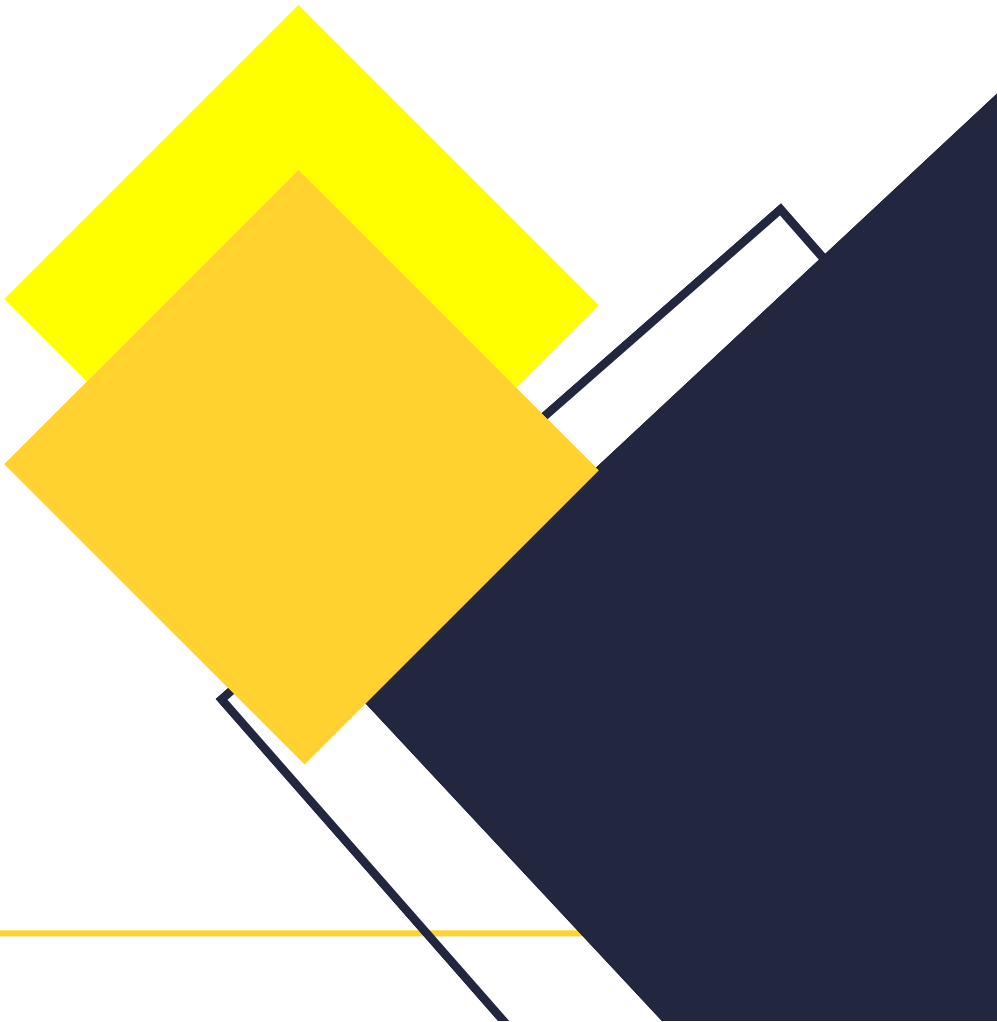
Heuristic	0	1	2	3	4
Heuristic 1. Visibility of System Status	-	-	33.3%	33.3%	33.3%
Heuristic 2. Match between System and the Real World	100%	-	-	-	-
Heuristic 3. User Control and Freedom	-	-	33.3%	66.7%	
Heuristic 4. Consistency and Standards	100%	-	-	-	-
Heuristic 5. Error Prevention	66.7%	-	33.3%	-	-
Heuristic 6. Recognition rather than Recall	100%				
Heuristic 7. Flexibility and Efficiency of Use	66.7%	-	33.3%	-	-
Heuristic 8. Aesthetic and Minimalist Design	33.3%	-	-	66.7%	-
Heuristic 9. Help Users Recognize, Diagnose, and Recover from Errors	100%	-	-	-	-
Heuristic 10. Help and documentation	100%	-	-	-	-

So, heuristics 3 and 8 have more priority to fix. After that comes heuristic 1. Finally heuristics 5,and7 .

2.2.3 Summary of Task:

As a result of the two techniques of usability expert analysis, we found the " Submit Projects" task has usability issues that have to fix and we found some good effects on usability.
The usability problems we found in learnability are guessability - sub-principle of familiarity- since the user cannot guess where he can find the submission section. In robustness, we found a problem in responsiveness, since it does not tell the response time or any loading bar when click on submit icon. Furthermore, the recoverability is not supported in the "submit project" task since the user cannot remove the submission and submit a new folder before the end of the duration. We suggest to have unique section and icon for project submission, to fix the usability problem. Also, to provide some degree of system pre-emptive for teachers when uploading project submission section, and prevent uploading the project in any section that not related to project.
The good effect of usability is in flexibility since the user has the control , substitutivity and customizability. The system also provide clear labeling button, so when you see it, you know the meaning of it and its functionality.

2.3 "Attend Virtual Classroom" Task



2.3.1 Heuristic evaluation technique:

Step 1: Define the scope of your evaluation.
I will test attend virtual classroom in blackboard.

Step 2: Know your end-user.
The users are students at IMBS university, some are familiar with submitting and others are not.

Step 3: Choose your set of heuristics.
I will choose Nielsen's Ten Heuristics .

Step 4: Set up an evaluation system and identify issues.

I rate the system as :
0 = I don't agree that this is a usability problem at all
1 = Cosmetic problem only: need not be fixed unless extra time is available on project
2 = Minor usability problem: fixing this should be given low priority
3 = Major usability problem: important to fix, so should be given high priority
4 = Usability catastrophe: imperative to fix this before product can be released

Heuristic	Description	Rate
Heuristic 1. Visibility of System Status	The visibility of the system in the application is so not clear when the user joins the class the system does not show how much time it needs to load the session.	2
Heuristic 2. Match between System and the Real World	The match between our system and the reel world is actually pretty good and does not have any problem since the section is called (virtual classes) and it got an icon next to it that reflects the meaning.	0
Heuristic 3. User Control and Freedom	In our system the user has the ability to leave the session if they joined by mistake and they also can rejoin.	0
Heuristic 4. Consistency and Standards	When user want to enter a session or even when the user in the class all the icons used is so clear and consistent.	0
Heuristic 5. Error Prevention	The error prevention in our system is actually not that bad but sometimes it’s not that good ether, for example sometimes user may click the camera button accidently and because they have allowed the system to access the camera already it does not give them any notification that they opened their camera.	3

Heuristic	Description	Rate
Heuristic 6. Recognition rather than Recall	In virtual classes the recognition is actually so bad since the user does not get any notification that tells them that there is a new class in this moment, and in this case the user needs to always remember if they have a class or not and they may forget.	3
Heuristic 7. Flexibility and Efficiency of Use	For new users our system is quite not flexible to them, for example if I'm a new user and I want to turn on the mick the system will tell me that I need to give access to my microphone and it will take time for me to give the access and open my mick and say what I want.	2
Heuristic 8. Aesthetic and Minimalist Design	In the virtual classes the design is so simple and clear for user.	0
Heuristic 9. Help Users Recognize, Diagnose, and Recover from Errors	In virtual classes if there an error for example like having a bad internet connection the system will show a massage to the user to make them recognize it and they also would give them a solution to fix it by reconnecting the session.	0
Heuristic 10. Help and documentation	The virtual class has a help center put it is not very flexible and it does not give enough information.	2

Step 5: Analyze and summarize findings.

Result is :
After evaluating the task using heuristic evaluation technique we found that the system need to be fixed in several pointes:

- **The most important point** that needs to be fixed is the recognition and the recall since it has the highest rate and its a very important point that annoys most of the users.
- **The second important point** is the error prevention, the system must give warning messages to let the user know what will happened and make sure they truly want it.
- **Third problem** is the visibility of system status, since the user does not get enough information about the loud time needed.
- **The fourth point** is that the system needs to be more flexible with new users and act with them easily.
- **The last point** is to provide a more effective help center that answer all expected user questions.

2.3.2 Model-based Evaluation:

Using GOMS model for evaluation:

- Goal : Joining virtual classes for CS351.
- Operator: press join course room button.
- Method: 2 sub goal , using website blackboard or by link.
- Selection rules :

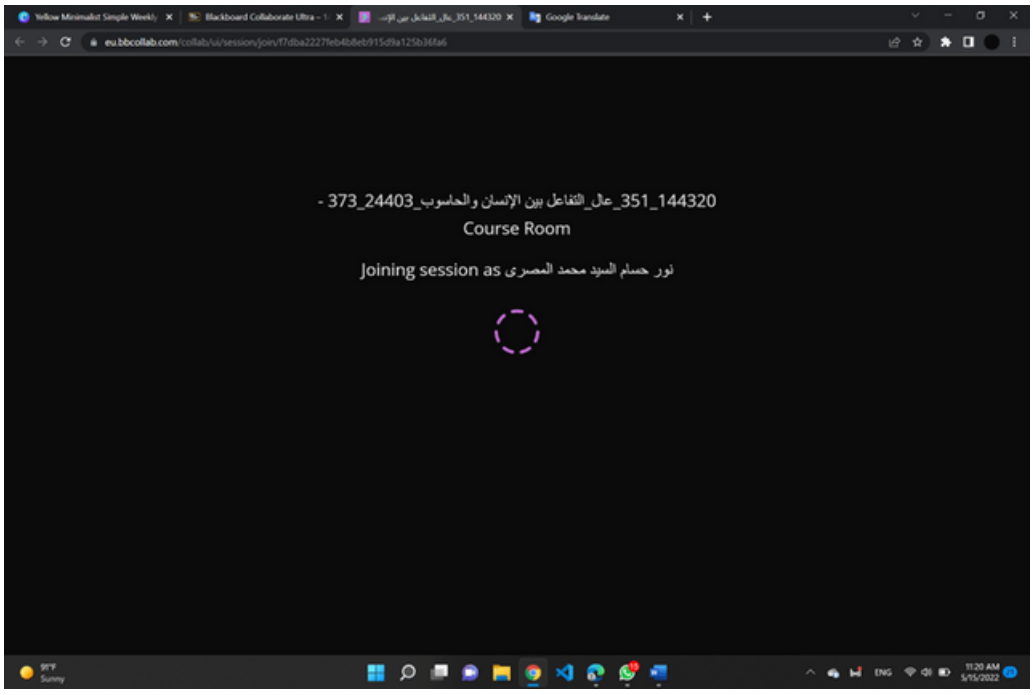
Note: we suppose the user is already viewing CS351 course.

GOAL: JOINING VIRTUAL CLASSES OF CS351 COURSE
[select
GOAL: USING-BLACKBOARD-WEBSITE
MOVE-MOUSE-TO-VC-SECTION
CLICK-ON-VC-BUTTON
MOVE-MOUSE-TO-COURSE-ROOM
CLICK- COURSE-ROOM -BUTTON
MOVE-MOUSE-TO-JOIN-COURSE-ROOM-BUTTON
CLICK- JOIN-BUTTON

GOAL: USING-LINK-SENT-BY-EMAIL
MOVE-MOUSE-TO-OUTLOOK-ICON
CLICK-ON-OUTLOOK-ICON
MOVE-MOUSE-INTO-INBOX-FOLDER
CLICK-ON-INBOX-FOLDER
MOVE-MOUSE-TO-VS-LINK-MASSAGE
CLICK-ON-VS-LINK-MASSAGE
MOVE-MOUSE-TO-THE-LINK
CLICK-THE-LINK
]

2.3.3 Summary of Task:

After we evaluated "Attend Virtual Classroom" task using two evaluation techniques we found that:
It supports some usability principles as the user can predicted what to do and how to do it only by looking at the interface. The interface is also familiar to the user since the user can guess what will happened when they do a specific task. We found that the system is kind of flexible to the user since the user have the ability to initiate dialog more that the system, also there is a good flow between the user and the system, this tells us that the interface as a good migratability.
In the other hand this task has some problems like: it does not support responsiveness to the user since the user can't know how long it will take until the page will open. Also, the system is quite not flexible when the user want to customize the use of some features like giving accesses to the system to use microphone. it also got some problems in the recognition since it makes the user try to remember by them selves that it helps remembering



example of bad responsiveness