



UTM
UNIVERSITI TEKNOLOGI MALAYSIA

SCHOOL OF COMPUTING
Faculty of Engineering

SESSION 2021/2022 SEMESTER 1

SECV 2113

HUMAN-COMPUTER INTERACTION

ALTERNATIVE ASSESSMENT

HEURISTIC EVALUATION REPORT

CASE STUDY

<https://www.utm.my/edutourism/> VS <https://sciencepark.upm.edu.my/>

NAME

GUI YU XUAN

MATRIC NO

A20EC0039

EMAIL

xuanhyuk@gmail.com

LECTURER'S NAME

DR JAMILAH MAHMOOD

SECTION

01

INTRODUCTION

According to Nielsen, J (1994) and Molich, R (1990), heuristic evaluation is done by having evaluators present an interface design and analyse usability problems in the design. The usability problems will be identified by user interface experts delve into the interface and find out the elements that caused the usability issues. (Jeffries, R., Miller, J. R., Wharton, C., & Uyeda, K., 1991). Anderson, N (n.d.) mentioned that heuristic evaluation is important and helpful because it allows us to gather feedback, find out usability issues, identify and focus on specific issues early in the design process.

Heuristic evaluation allows designers to design great products because detection of usability issues can be addressed early in the design phase. (Fard, A., 2019). The reason for conducting heuristic evaluation is efficiency. This is because a heuristic evaluation can be done even the product has not yet been completed. (Pixians Design Studio, 2018). Therefore, this project was heuristically evaluated of the websites' ability to identify usability issues and resolve them to improve user testing performance and experience.

According to Euphemia, W. (2020). Several stages need to be followed to conduct a heuristic evaluation. First, a list of appropriate heuristics to test must be built. Then, select a sample of evaluators who are a usability expert. After explaining the task, the evaluator can use the product to evaluate the specified elements. Following the evaluation phase, evaluator must be able to briefly present their findings and propose potential solutions to negative findings.

It can be said that conducting heuristic evaluation is very important to improve the user experience and capabilities of the product. However, even heuristic evaluation brings many advantages, but there are still limitations. From the understanding of Garvin, M (2020), usability experts are not easy to find, and it can be expensive to invite an expert for an evaluation. Usability issues identified by experts are based on the skill level of the experts. This means that some limitations of the product may not be found.

The websites involved in this project are UTM Campus Edu tourism (<https://www.utm.my/edutourism/>) and UPM Putra Science Park (<https://sciencepark.upm.edu.my/>). UTM Campus Edu Tourism is a website that provides quality tourism products and services on UTM campus. Some activities and accommodations are available on the website, such as recreational forest packages. The purpose of the website

is to monitor and manage the assets of the ecotourism park and to facilitate customers to book packages offered within the park. Meanwhile, UPM Technology Park is a website for sharing knowledge on technological innovations and offers educational tour packages for tourists. This website provides information on technological innovation and how UPM manages innovation in university. The purpose of the website is to promote the potential of technology, nurture and develop technology to enhance technology transfer activities, and to coordinate educational tourism on the UPM campus.

Corigliano, M. A. and Baggio, R. (2006) had done a heuristic evaluation of tourism websites. Graphical representation quality, clarity of description, etc. were assessed. Heuristic usability testing is done by distributing questionnaires to a sample of users. The results of average rating of 2.06 was obtained from usability testing. Therefore, by taking ideas from the evaluations of Corigliano, M. A. and Baggio, R., a heuristic evaluation of university websites was studied to improve the performance of selected websites by identifying usability problems. Therefore, the purpose of conducting research on these two websites is to find out the problems that users may encounter and improve the performance to make the website more user-friendly.

According to the research done by Khajouei, R., Ameri, A., & Jahani, Y. (2018), heuristic evaluation had been conducted to evaluate the usability issues of the hospital information system so that designers able redesign systems, time, and costs for designing system can be reduced. Therefore, more users will be attracted to use the system. Researchers found that the usability problems identified by heuristic evaluation is at a medium level. However, the results also showed that the heuristic evaluation is a suitable and preferred method to identify the usability issues of the system.

A heuristic evaluation of the smartphone launchers had been conducted by Petrovčič, A., Rogelj, A., & Dolničar, V. (2018). The result showed that contents and perception had the most usability problems to the older adults. This is because the ability of older adults to recover errors had been limited as well as their visual, auditory and tactile sensation.

In this report, the method section will list and explain the heuristics, describe the process of conducting the heuristic evaluation, and select suitable tasks for the two sites. The results section will display 20 violations for both sites and assess the severity of the violations found. The discussion section will suggest improvements for each violation and summarize the results and analysis between the two sites. The concluding section will conclude the report and provide reflection as it is completed.

METHOD SECTION

The type of heuristic evaluation used is the 10 usability heuristic evaluations by Jakob Nielsen. The table below shows the 10 usability heuristics for user interface design.

Principle	Description
Visibility of system status	The system should keep users informed about what is going on with appropriate feedback within a reasonable amount of time.
Match between system and the real world	Design should speak the language of the user. Use words, phrases, and concepts that users are familiar with, rather than internal jargon. Follow real-world conventions so that information appears in a natural and logical order.
User control and freedom	Users often perform actions incorrectly. They need a clearly marked "emergency exit" to exit unwanted operations without having to go through an extended process.
Consistency and standards	Users don't have to wonder if different words, situations, or actions mean the same thing. Follow platform and industry practices.
Error prevention	Good error messages are important, but the best designs are careful to prevent problems from happening in the first place. Either eliminate error-prone conditions or check for them and give the user a confirmation option before committing the action.
Recognition rather than recall	Minimize the user's memory load by making elements, actions, and options visible. Users don't have to remember information from one part of the interface to another. Information required to use the design, such as field labels or menu items, should be visible or easily retrieved when needed.
Flexibility and efficiency of use	Shortcuts - hidden from novice users - can speed up interaction for expert users so that the design can cater to both

	inexperienced and experienced users. Allows users to customize frequent operations.
Aesthetic and minimalist design	Interfaces should not contain irrelevant or rarely needed information. Each additional unit of information in the interface competes with related units of information and reduces their relative visibility.
Help users recognize, diagnose, and recover from errors	Error messages should be in plain language (no error codes), pinpoint the problem, and constructively suggest a solution.
Help and documentation	Preferably the system does not require any additional explanation. However, documentation may be required to help users understand how to accomplish their tasks.

Table 1: 10 Usability Heuristic Evaluation (Nielson, J., 1994)

For the heuristic evaluation, I will first choose a task that both websites can perform. Then, I'll focus on the design interface for both websites. Afterwards, I would document the problems I had while doing the task and list the design interface that violated the user experience. After identifying the problems, I will rate each violation based on the severity ratings.

Severity ratings can fix violations by providing a rough estimation of the need for additional availability work. (Nielson, J., 1994). Jakob Nielson had proposed 0 to 4 rating scale to rate:

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

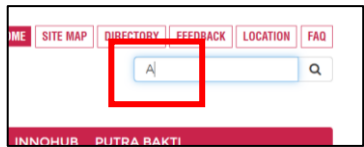
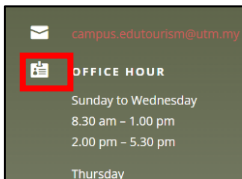
The three tasks that will be performed are:

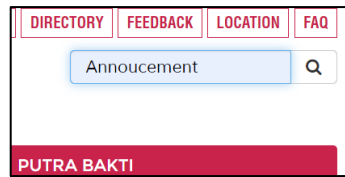
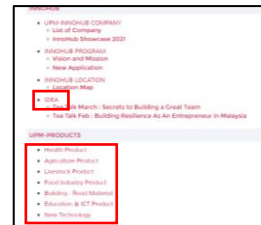
Task 1: Get the information of the offered edu tourism activities

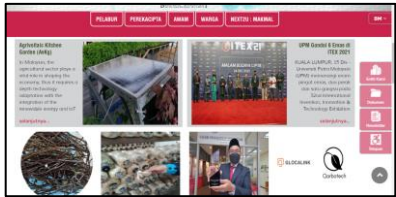
Task 2: View the information in the announcement

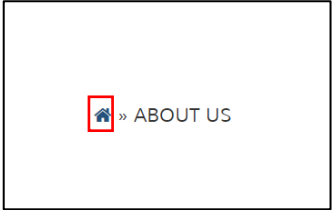
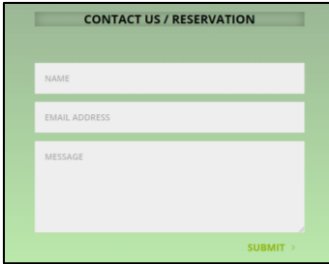
Task 3: Get the information of the facilities in the campus

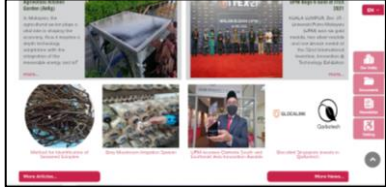
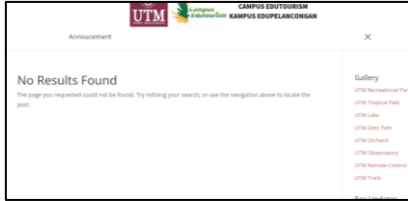
RESULTS SECTION

No	Usability Heuristics & Severity Rating	Website UTM	Website UPM
1	Visibility of system status Severity Rating: 2 (Minor usability problem) As without providing the list of keywords, users still able to find out the elements they want to search.	User unable to know the results which the keywords start with “A” since the search bar didn’t display the keywords.  The figure shows that the search bar does not provide search results starting with "A".	User unable to know the results which the words start with “A” since the search bar didn’t display the keywords.  The figure shows that the search bar does not provide search results starting with "A".
2	Match between system and the real world Severity Rating: 1 (Cosmetic problem) As the describe words had been provided, hence it	The icon used to show office hour is not familiar because normally the icon used to show office hour is a clock. 	The icon used to show setting is not familiar because normally the icon used to show setting is gear. 

	can be fix if the time is enough.	As you can see from the figure, the icons used to represent office hours is different from the real life. Basically, we will use a clock to represent time.	As you can see from the figure, the icons used to represent setting is different than other websites. Basically, we will use a gear to represent setting.
3	User control and freedom Severity Rating: 3 (Major usability problem) The user experience had been affected if the search bar cannot meet the users' needs. This may result in loss of user access to the website.	If you press the "X" button, the search bar will close. However, the user just wants to delete the word due to a misspelling.  The figure shows an "X" button for the user to press. When you press the "X" button, the search bar will close. However, the user presses the "X" button to delete or change the word that has been entered.	There is no delete or "X" button to delete the words that had been typed. User must delete it manually.  The figure shows there is no "X" button for the user to press when user wish to change or remove the word that has been entered.
4	Consistency and standards Severity Rating: 2 (Minor usability problem) The arrangement of the elements has the low priority is because it do not give great effect on the user experience.	The images and the description words are arranged in the different size. 	The font size and font format are not consistent.  The font format of the element list under UPM-PRODUCTS should be the same as IDEA.

		The figure shows that the arrangement of the pictures is not consistent.	
5	Consistency and standards Severity Rating: 4 (Usability catastrophe) It is important to solve this problem. This is because there will be some users who do not understand Malay and English.	The website is in dual languages which are Malay and English. The language used should be consistent, whether the whole page is in English or in Malay.  The figure shows that the information for the recreational forest package is in Malay while other elements in the page is in English.	The website is in dual languages which are Malay and English. The language used should be consistent, whether the whole page is in English or in Malay.  The figure shows that the news is in English. However, the user chose Malay.
6	Error prevention Severity Rating: 3 (Major usability problem) It may affect the user experience as the error cannot be recognize by users.	The system should tell the user the misspelled word by underlining it.  The figure shows that the misspelled word is not recognized by the user because there is no alert to remind the user.	The system should tell the user the misspelled word by underlining it.  The figure shows that the misspelled word is not recognized by the user because there is no alert to remind the user.

7	Recognition rather than recall Severity Rating: 3 (Major usability problem) It will affect user experience because user do not know what the mean of the elements is.	The system should tell the user what information the user will get before users access it.  The figure shows that there are no hints to help the user identify the element.	It is better to have a pop-up label for home icon to help user to recognize the action.  The figure shows that there are no hints to help the user identify what action done by the icon.
8	Flexibility and efficiency of use Severity Rating: 4 (Usability catastrophe) This usability issues must be fix before release. Users do not like to visit a website that is not flexible and efficient.	Reservations can only be made by submitting name, email address and comment. This is insufficient as the user needs to wait a long time to ensure that the reservation has been accepted.  The figure shows that the reservation only can made by providing name, email address and message. This is not insufficient as users must think about the details to make a booking.	No information that tells users what edu-tourism packages had been offered.  The figure shows that there is no information about the offered activities.

9	Aesthetic and minimalist design Severity Rating: 4 (Usability catastrophe) It is important to fix this problem. This is because it is the first impression of users to this website.	Too many fonts cause user aesthetic fatigue and can't find the main elements.  The figure shows that there are too many contents which will cause user aesthetic fatigue.	The complex visual elements with little white space causing users unable to find the necessary elements.  The diagram shows that there are too many elements packed together, which will hide the necessary elements from the user.
10	Help users recognize, diagnose, and recover from errors Severity Rating: 2 (Minor usability problem) This usability issue has the low priority is because it do not give great effect on the user experience.	The system should provide suggestion to solve the constraints that have been made.  The figure shows that no results found are displayed on the screen and there are no suggestions to help users identify constraints.	The system should provide suggestion to solve the constraints that have been made.  The figure shows that no match found are displayed on the screen and there are no suggestions to help users identify constraints.
11	Help and documentation	Help and documentation are not available on this site. Users may become lost and unable to obtain assistance while using the website.	Instead of showing the results found, provide a link for user to visit the page is more useful. This is because when users ask

	Severity Rating: 3 (Major usability problem) It will affect user experience because user cannot get the information they want in a short period of time.	 The figure shows that there are no helpdesk or FAQ questions in this website.	for help, it means they can't find what they're looking for in the website.  The figure shows that the result of 1 match found is shown without providing any link to the page.
--	---	--	---

Table 2: The elements that are violating principle of heuristic evaluation

DISCUSSION SECTION

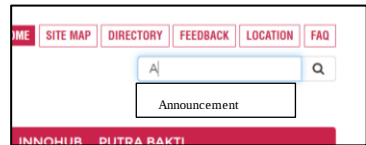
Website	UTM	UPM
Usability Heuristic	Visibility of system status	
Issues	User unable to know the results which the keywords start with "A" since the search bar didn't display the keywords.	User unable to know the results which the words start with "A" since the search bar didn't display the keywords.
Solution	The keywords which are start with "A" should be listed as shown in figured. 	The keywords which are start with "A" should be listed as shown in figured. 

Table 3: The solution for visibility of system status violation

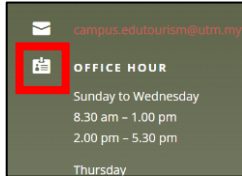
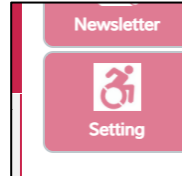
Website	UTM	UPM
Usability Heuristic	Match between system and the real world	
Issues	The icon used to show office hour is not familiar because normally the icon used to show office hour is a clock. 	The icon used to show setting is not familiar because normally the icon used to show setting is gear. 
Solution	Instead of a board, clock icon can be used to represent office hours. Therefore, the message from the icon will be more obvious to user.	Instead of a running person, gear icon can be used to represent setting. Therefore, the message is more obviously to users.

Table 4: The solution for match between system and the real world violation

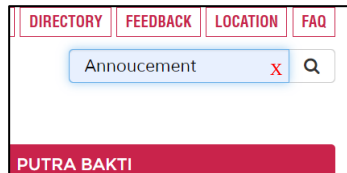
Website	UTM	UPM
Usability Heuristic	User control and freedom	
Issues	If you press the "X" button, the search bar will close. However, the user just wants to delete the word due to a misspelling. 	There is no delete or "X" button to delete the words that had been typed. User must delete it manually.
Solution	The function of the "X" button should be changed to clear the words that had been entered.	"X" button should be added to clear the words that had been entered. 

Table 5: The solution for user control and freedom violation

Website	UTM	UPM
Usability Heuristic	Consistency and standards	
Issues	The images and the describe words are arranged in the different size.	The font size and font format are not consistent.
Solution	The images and the describe words should be rearrangement. The images and describe words should be in the same length and same width.	The font format and font size should be determined first. For example, all the topics should be in capital with the 14-font size while the elements below the topics should be bold with the 10-font size.

Table 6: The solution for consistency and standards violation

Website	UTM	UPM
Usability Heuristic	Consistency and standards	
Issues	The website is in dual languages which are Malay and English. The language used should be consistent, whether the whole page is in English or in Malay.	The website is in dual languages which are Malay and English. The language used should be consistent, whether the whole page is in English or in Malay.
Solution	The language used by the website should be consistent. When users view in English mode, then all the content should be in English. More languages need to provide because not all users able to read Malay or English.	The language used by the website should be consistent. When users view in English mode, then all the content should be in English. More languages need to provide because not all users able to read Malay or English.

Table 7: The solution for consistency and standards violation

Website	UTM	UPM
Usability Heuristic	Error prevention	

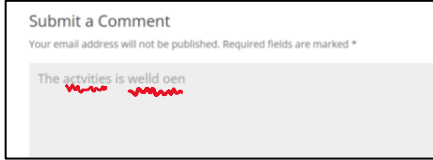
Issues	The system should tell the user the misspelled word by underlining it.	The system should tell the user the misspelled word by underlining it.
Solution	The misspelled word should be underlined or gave the suggestion to correct the words. 	The misspelled word should be underlined or gave the suggestion to correct the words. 

Table 8: The solution for error prevention violations

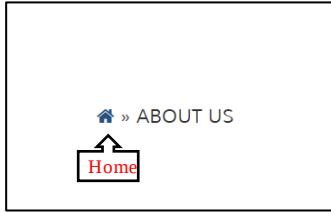
Website	UTM	UPM
Usability Heuristic	Recognition rather than recall	
Issues	The system should tell the user what information the user will get before users access it.	It is better to have a pop-up label for home icon to help user to recognize the action.
Solution	Instead of displaying an image, the topic that will be displayed when the element is clicked must be shown to user. 	Providing the pop-up label so that user will know the action will be done by the icon. 

Table 9: The solution for recognition rather than recall violation

Website	UTM	UPM
Usability Heuristic	Flexibility and efficiency of use	
Issues	Reservations can only be made by submitting name, email address and comment. This is insufficient as the user needs to wait a long	No information that tells users what edu-tourism packages had been offered.

	time to ensure that the reservation has been accepted.	
Solution	The payment and booking interface should be provided for the user. Booking details such as name, phone number, data, time, etc. should be provided for the user.	Images and information about the activities and packages should be provided so that users can understand the activities offered by the University.

Table 10: The solution for flexibility and efficiency of use violation

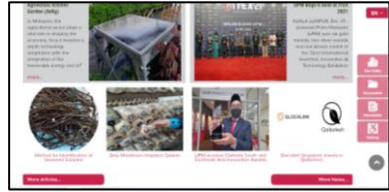
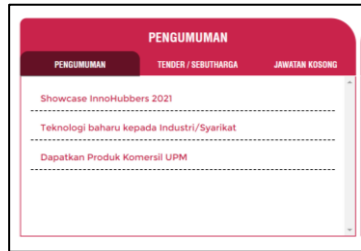
Website	UTM	UPM
Usability Heuristic	Aesthetic and minimalist design	
Issues	Too many fonts cause user aesthetic fatigue and can't find the main elements.	The complex visual elements with little white space causing users unable to find the necessary elements. 
Solution	Providing the poster with the topic only so that users can identify the elements they want quickly without affected by the unnecessary elements. 	The complex visual images cause user fell fatigue. Hence, it is better to show the elements as picture below when there are too many elements to be displayed. 

Table 11: The solution of Aesthetic and minimalist design violation

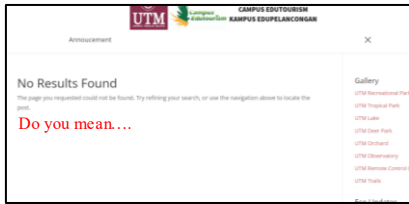
Website	UTM	UPM
Usability Heuristic	Help users recognize, diagnose, and recover from errors	
Issues	The system should provide suggestion to solve the constraints that have been made.	The system should provide suggestion to solve the constraints that have been made.
Solution	Provide suggestions such as "Do you mean..." to correct the user's spelling or help the user identify the correct page based on synonyms for the words the user enters. 	Provide suggestions such as "Do you mean..." to correct the user's spelling or help the user identify the correct page based on synonyms for the words the user enters. 

Table 12: The solution for help users recognize, diagnose, and recover from errors violation

Website	UTM	UPM
Usability Heuristic	Help and documentation	
Issues	Help and documentation are not available on this site. Users may become lost and unable to obtain assistance while using the website.	Instead of showing the results found, provide a link for user to visit the page is more useful. This is because when users ask for help, it means they can't find what they're looking for on the website.
Solution	FAQ interface should be provided as it is able to answers the questions that frequently asked by users.	Provide a function such as "Press <u>here</u> to enter the page." is more useful than only show 1 match is found.

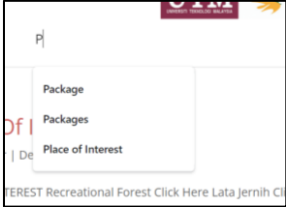
		SEARCH CONTAINS : 'PRICE', 'FOR' AND 'PACKAGE' NEWS : NO match found ARTICLE : NO match found WEB CONTENT : 1 match found Press here to enter the page. DOCUMENT : NO match found ACTIVITY : NO match found DIRECTORY : NO match found LOCATION : NO match found ALBUM : 0 match found
--	---	---

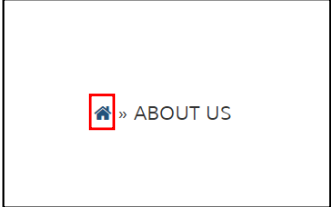
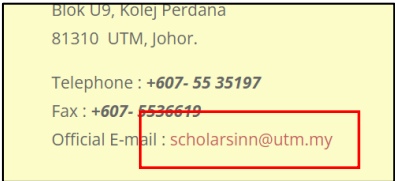
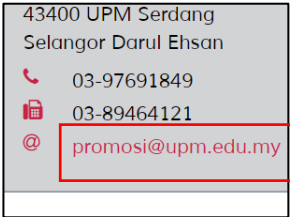
Table 13: The solution for help and documentations violation

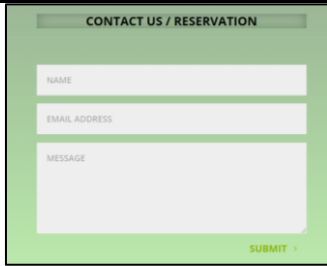
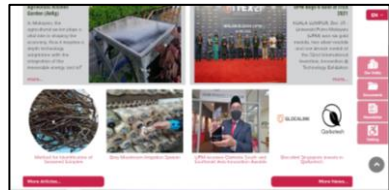
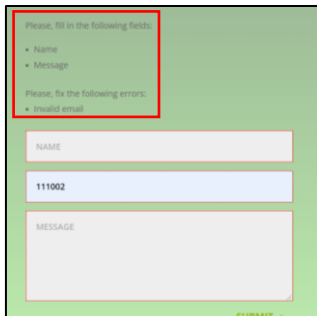
Through the research on both websites, I found that some functions and elements provided on the websites have followed the principles of heuristic evaluation while some are violating the principles of heuristic evaluation. The table below will show the comparison of the positive and negative findings based on the 10 principles of heuristic evaluation on both websites.

Usability Heuristic	Website UTM	Website UPM
Visibility of system status	Positive Finding: The changing of colour shows that the users is on the Packages page.  Negative Finding: User unable to know the results which the keywords start with “A” since the search bar didn’t display the keywords. 	Positive Finding: The box which filled with red colour shows that users is on the UTAMA page.  Negative Finding: Users unable to know which page is them on because there is no difference between the bars. 
Match between system and the real world	Positive Finding: Some icons used are easily recognise by users.	Positive Finding: The icons used are easily recognise by users.

	Negative Finding: The icon used to represent office hours is not familiar.	Negative Finding: The icon used to represent email in other pages is not familiar.
User control and freedom	Positive Finding: The small arrow displayed in the bottom right corner allows the user to get to the top of the page as quickly as possible. Negative Finding: If you press the "X" button, the search bar will close. However, the user just wants to delete the word due to a misspelling.	Positive Finding: The small arrow displayed in the bottom right corner allows the user to get to the top of the page as quickly as possible. Negative Finding: There is no delete or "X" button to delete the words that had been typed. User must delete it manually.

Consistency and standards	Positive Finding: The size of the pictures and the format are same.  Negative Finding: The images and the description words are arranged in the different size. 	Positive Finding: The video size and format are the same.  Negative Finding: The font size and font format are not consistent. 
Error prevention	Negative Finding: The system should tell the user the misspelled word by underlining it. 	Negative Finding: The system should tell the user the misspelled word by underlining it. 
Recognition rather than recall	Positive Finding: Searching history had been saved in the system. Therefore, users will remember the previous search. 	Positive Finding: Users no need to memorize the system path as it has been shown.  Negative Finding: It is better to have a pop-up label for home icon to help user to recognize the action.

	Negative Finding: The system should tell the user what information the user will get before users access it. 	
Flexibility and efficiency of use	Positive Finding: User will direct to the mailbox when press the email. It is efficient as user no need to take another step such as close the tab and open Gmail tab to send the email.  Negative Finding: Reservations can only be made by submitting name, email address and comment. This is insufficient as the user needs to wait a long time to ensure that the reservation has been accepted.	Positive Finding: User will direct to the mailbox when press the email. It is efficient as user no need to take another step such as close the tab and open Gmail tab to send the email.  Negative Finding: No information that tells users what edu-tourism packages had been offered. 

		
Aesthetic and minimalist design	Positive Finding: There are only the necessary elements shown in the page.  Negative Finding: Too many fonts cause user aesthetic fatigue and can't find the main elements. 	Positive Finding: There are only the necessary elements shown in the page.  Negative Finding: The complex visual elements with little white space causing users unable to find the necessary elements. 
Help users recognize, diagnose, and recover from errors	Positive Finding: The details of the error had been told. 	Positive Finding: The details of the error had been told.  Negative Finding:

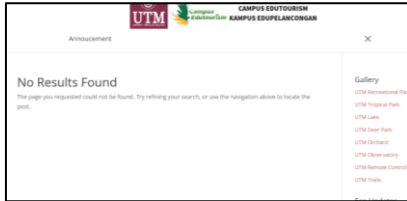
	Negative Finding: The system should provide suggestion to solve the constraints that have been made. 	The system should provide suggestion to solve the constraints that have been made. 
Help and documentation	Positive Finding: Information on how to get to the university by different types of transportation had been told in the great detail.  Negative Finding: Help and documentation are not available on this site. Users may become lost and unable to obtain assistance while using the website. 	Positive Finding: FAQ questions are provided in the websites which able to help users solve the problems at a short time.  Negative Finding: Instead of showing the results found, provide a link for user to visit the page is more useful. This is because when users ask for help, it means they can't find what they're looking for on the website. 

Table 14: Comparison between both websites

The table above shows a comparison of heuristic evaluations between the two websites.

For visibility of system status, we can see positive and negative findings for both sites. The colour rendered on the word tells the user where the user is currently. However, for website UPM, bars that don't change colour can cause users to get lost on the website. For website UTM, the negative finding of system status visibility is the performance of the search bar, where the system does not list keywords based on the words entered by the user.

Both websites follow the rules of principle of matching the system with the real world. Both websites use icons that are easily recognizable by users, such as location, phone, and email. However, some icons used on the websites violate this principle. This is because the user is not familiar with the icon used to represent something.

The small arrows provided in the bottom right corner of the website allow users to get to the top of the page as quickly as possible. The performance of the "X" button on the website's UTM and the absence of the "X" button on the website's UPM violates the principles of user control and freedom. This is because users cannot execute as they want.

The arrangement of images and the format of the elements violate the principle of consistency and standards. However, some pages on the website follow the principle of consistency and standards. There are many elements on a website that violate the principle of error prevention. This is because the system does not provide any suggestions or highlight mistakes made by the user. Therefore, the user may perform some functional errors.

The system path displayed at the top of the UPM website page helps users remember the system path, while the search history saved on the website UTM helps users remember previous searches. These characteristics showed positive finding for the principle of recognition rather than recall. However, some elements on the website do not provide information to tell the user which elements exist and what action the element takes.

Both websites follow the principles of flexibility and efficiency of use. The email address provided on the website allows users to go directly to the mailbox when pressing the email address. Therefore, the user can save time by doing this. However, if the user wishes to make a reservation on the website UTM, the user needs to email the details to the administrator of the website, which is very insufficient as the user may not know the progress of their reservation. Additionally, the UPM website only tells users that they offer educational tourism packages while at university but does not provide details on the activities offered.

Some pages of both websites only display necessary elements that conform to the principle of aesthetics and minimalist design, while some pages of both websites display some unnecessary elements, which may cause users' aesthetic fatigue and not be able to find important elements.

For help users recognize, diagnose, and recover from errors, both websites display details of mistakes users make, such as mistyped email addresses. However, neither website offers any suggestions to address user limitations in search functionality.

For help and documentation, the UTM website provides information on how to get to the university by different types of transport and is informed in detail, while the UPM website provides FAQs that can help users resolve issues in a short time. However, some features on both sites violate the principles of help and documentation. The lack of FAQs and help on the UTM website can lead to users getting lost and unable to get help, and the functionality to display the results found from the search bar of UPM website does not perform well because the user cannot get help from the displayed results.

CONCLUSION

Through this project, I was able to identify usability issues that violate the principles of heuristic evaluation on the UTM Campus Edu and UPM Putra Science Park tourism websites. From the findings, several solutions have been prepared to improve the user experience and user interface. Through the comparisons that have been made of the two websites, I am amazed that there are similar usability issues happening on both websites and there are some usability issues happening on one website and the other website has followed the principle.

Before studying the usability of the heuristics, both websites performed well for me while I was using those websites. However, when I go into the details of heuristic evaluation principles, I find that some features or some functions on a website affect the user experience and are not user friendly. On top of that, I also found that some of the features were friendly to me because they met my needs.

Although both websites have some violations of the heuristic evaluation principle, I still find it difficult to identify the 11 violations. The rating part was the hardest for me because

I had to analyse the problem to determine the level of solution. However, it was fun because I was getting a chance to involve myself to make the website better.

Through this project, I also learned that it is impossible for a web designer to identify all the problems that can affect the performance of a website. Therefore, it is important to involve evaluators in conducting heuristic evaluations. This is because the results obtained from the heuristic evaluation can help the designer to improve the quality of the website. In addition, the results of the heuristic evaluation can help the designer evaluate the problems that need to be solved first by identifying the level of the severity rating.

In conclusion, before usability testing, heuristic evaluation must be done. Since heuristic evaluation can provide quick feedback on usability issues, designers can get a lot of good and bad feedback from the product in a short period of time. Straightforwardly, we can say that heuristic evaluation can help designers solve most of the usability problems in a short period of time.

REFERENCES

1. Nielsen, J. (1994, April). Usability inspection methods. In *Conference companion on Human factors in computing systems* (pp. 413-414).
2. Nielsen, J., & Molich, R. (1990, March). Heuristic evaluation of user interfaces. In *Proceedings of the SIGCHI conference on Human factors in computing systems* (pp. 249-256).
3. Jeffries, R., Miller, J. R., Wharton, C., & Uyeda, K. (1991, March). User interface evaluation in the real world: a comparison of four techniques. In *Proceedings of the SIGCHI conference on Human factors in computing systems* (pp. 119-124).
4. Anderson, N. (n.d.). How (and Why) to Conduct a Heuristic Evaluation. Retrieved from 23 January 2022, on <https://dscout.com/people-nerds/heuristic-evaluations#:~:text=Why%20conduct%20a%20heuristic%20evaluation&text=Overall%2C%20heuristic%20evaluations%20allow%20you,and%20inexpensive%20feedback%20to%20designers>
5. Corigliano, M. A., & Baggio, R. (2006, January). On the significance of tourism website evaluations. In *ENTER* (pp. 320-331).

6. Nielsen, J. (1994, April 24). 10 Usability Heuristics for User Interface Design. Retrieved January 27, 2021, from <https://www.nngroup.com/articles/ten-usability-heuristics/>
7. Khajouei, R., Ameri, A., & Jahani, Y. (2018). Evaluating the agreement of users with usability problems identified by heuristic evaluation. *International journal of medical informatics*, 117, 13-18.
8. Petrovčič, A., Rogelj, A., & Dolničar, V. (2018). Smart but not adapted enough: Heuristic evaluation of smartphone launchers with an adapted interface and assistive technologies for older adults. *Computers in Human Behavior*, 79, 123-136.
9. Fard, A. (2019). What Is Heuristic Evaluation and How Does It Improve Your Product? [2022 Upd]. Retrieved on 25 January 2022, from <https://adamfard.com/blog/heuristic-evaluation>
10. Pixians Design Studio. (2018, 11 December). Heuristic Evaluation: Process and Importance. Retrieved on 25 January 2022, from <https://medium.com/pixians/heuristic-evaluation-process-and-importance-88c16389fec9>
11. Emphemia, W. (2020, 4 July). Heuristic Evaluation: How to Conduct a Heuristic Evaluation. Retrieved on 25 January 2022, from <https://www.interaction-design.org/literature/article/heuristic-evaluation-how-to-conduct-a-heuristic-evaluation>
12. Garvin, M. (2020, 19 July). For improved ROI, conduct heuristic evaluations prior to usability testing. Retrieved on 25 January 2022, from <https://uxdesign.cc/use-heuristic-evaluations-prior-to-usability-testing-to-improve-roi-2d6d6865dd18>