Vacation: Pre-Trip

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UX Design Report

ABSTRACT

The study's primary goal is to show how important it is to prepare for a trip in advance to reduce stress when travelling to new locations [1]. To do this, context-rich data is collected based on visitors' behavior and destination preferences [2]. Many apps on the market offer a pleasant travel experience, but most need vital components to achieve it. Our "Vacation: Pre-trip" project fills those gaps by offering precise location information, flight reservations, holiday packages, and much more with excellent UI and UX. Contextual inquiry is another study component that helps us learn more about the user [3]. Additionally, depending on the information received, we create low-fidelity prototypes and correct the low-fidelity prototypes' design problems based on the cognitive walkthrough.

Author Keywords

Vacation; Pre-trip; Cognitive walkthrough; Low-fidelity prototype; Contextual inquiry

INTRODUCTION

Planning a trip is essential since it lets you acquaint yourself with the locations and attractions you want to see. People love to do many things while on vacation but can't entirely do them if nothing is prepared. As a result, excellent vacation offers and the best travel experiences are missed [1]. To avoid this, numerous apps, such as MakeMyTrip [5] and TripAdvisor [4], help with business and leisure travel planning by providing travel information and finding low-cost flights and popular destinations.

To avoid this, there are numerous apps, such as MakeMyTrip [5] and TripAdvisor [4], that help with business and leisure travel planning by providing travel information, finding low-cost flights, and listing popular destinations [4]. However, these apps do not provide some services, such as a flight schedule, a list of activities or attractions open on specific dates, or a hotel comparison. Our project "Vacation: Pre-trip" offers all these features that enhance the current features and provide users with great flexibility to accomplish this. When buying a flight using a time filter, users can choose the departure and arrival times to narrow the results further and only see flights available during the user-specified time window. The user-provided dates will filter all activities and attractions, removing the time-consuming process of reserving a spot in any attraction and ultimately stating that the related activity is not available on the specified dates.

To create a user-centered mobile trip planning application, we investigated three vacation planning applications for our project, including MakeMyTrip [5], GoIbibo [6], Expedia [7], etc. Our project was based on MakeMyTrip [5]. In the application, we tried to understand the user's perspective on already-existing applications, their demands for holiday planning, and the challenges they face when booking trips. Our team members conducted the contextual inquiry in an environment where information was gathered. Based on this data, we can learn more about the target users [3]. The user was given a quick overview of the application and instructed to do specific tasks. The tasks include making flight and hotel reservations and looking for activities and attractions. The users' observations, ideas, and comments were recorded to analyze the task and create prototypes.

These findings suggest that the application will aid users in achieving the desired outcomes. In the end, consumers can personalize their vacation packages, choose their arrival and departure times when buying flights, have date choices to help them find activities offered on that day, and compare hotels to get the best one. These findings encourage the development of low-fidelity prototypes. We examined our low-fidelity prototype using a cognitive walkthrough by the evaluators to acquire the optimized design for the application. The experts looked over the prototype during this procedure and found design problems. We modified the low-fidelity prototype from the cognitive walkthrough data that addresses every design flaw. This is accomplished by improving upon and modifying the cognitive walkthrough findings' features.

Finally, the results showed that users valued usability more than a visually appealing user interface. In addition, customers desired more freedom in organizing their vacations. Users requested additional features such as activity and cab bookings and more basic ones such as flight and hotel booking. The new features were viewed favorably and with curiosity by users.

BACKGROUND

Mobile technology has dramatically changed our lifestyle, and smartphones can do many things. We can use the smartphone to pay the bill, book a hotel etc. Thanks to those mobile applications and online platforms that make those tasks simple and convenient. Trip planning on mobile phones has become many people's choice, especially retrieving information when visiting unknown destinations [8]. As the

trip-planning is a complex cognitive task, even with the application we have now; users still need help finding out what and how to achieve their goals [9]. For example, when using the application, the user may need clarification on navigating the page. Or the user needs to know whether an action is succussed or not. To tackle this problem and improve the user experience, we want to explore and design a user-centered interface for the smartphone's pre-trip planning application.

Many researchers are working on searching, optimizing, personalizing the trip planner, and designing an interface for flight booking. Those works helped us understand the challenges when designing an interface for a trip-planning application. In addition, it suggests some foundations or guidelines for designing a trip-planning application. Ivan Burmistrov's study introduces five guidelines: "defines the target user, makes the mobile application a supplement to a website, reduces functionality to a necessary minimum, provides support for multitasking and interruptions and makes the application location-aware" [9]. Following these guidelines, we made a persona as our target user (Abby Jones), a doctoral student at Dalhousie. With the user persona, we can understand the user's motivation and the use case that at what circumstances the user needs a feature. And make our application compliant on websites, so users can also access our service by the browser. According to "reduce functionality to a necessary minimum," we limited the element on a page to 7 [9]. In addition, we give feedback on every user's action and show the system's status. In the study by Sheng Wang et al., they propose a novel search interface allowing the user to inquire further without text input [9]. The interface is a top map view with colorful circles on it. Each circle represents a city attraction, and color and size mean the attraction's popularity [10]. The color and size indicate the popularity of the city's attractions helping users to find the most popular spot visually and fast. We want to use the tricks in our design too.

By taking the course, CSCI 5601, we learn several design Paradigms, principles, and affordance. Five types of affordances measure usability, cognitive affordance, physical affordance, sensory affordance, functional affordance, and emotional affordance. The contract, repetition, alignment and proximate (CRAP) help us design the prototype. For example, the layout of the page, size of the page and color of the element. By adopting CRAP, we can increase the sensory affordance of the user. In addition, the gestalt principles make the user to perceiving things easier. We can heuristically evaluate the design with those guidelines, principles, and paradigms. To design a user-centered design, we plan to research affordance and refine the design.

PROBLEM STATEMENT

To learn more insights and identify the affordance, we need to figure out that:

1. How the user typically plans the trip includes hotel booking, flight booking, exploring city attractions etc.
2. What features does the user dislike and like?
3. What features does the user want besides the feature that current applications have?

We answer the questions above by conducting user research with a laboratory approach. We will ask the user to perform the tasks and observe the user's behaviour while they perform the task. For each task the user has done, the user will be asked several questions about the task. Such as why they do something instead of others. After the experiment, a short interview will give to the user. During the interview, we can probe the answer to dig out more insights and evaluate it with coding sheets and affinity diagrams.

By understanding those, we modify and refine the current application to make our low-fidelity prototype.

We need to evaluate our prototype to know

1. Does the user know what to do when they see the interface?
2. Does the user get feedback on what they do?
3. Does the result meet the expectation of the user for their action?
4. Find the problem and refine the prototype.

A cognitive walkthrough was conducted to answer these questions. User persona and tasks were briefed to the evaluators. The evaluators answered the questions we provided in the cognitive walkthrough. We create a cost-important table based on the answer given by the evaluator. By referencing the cost-important table, we decide what problem needs to be fixed now and modify it. We plan to evaluate this prototype version by conducting user research with 5 participants.

LEARNING ABOUT USERS

Contextual Inquiry Process

It is very important to understand the users' current work practices and behavior when they make a booking for a vacation. It helps to shape the requirements and features in the early stages of the project. For this, a contextual inquiry was conducted with a total of 3 users. Conducting a contextual inquiry is easy and doesn't require much time for the participants. It also shows the users performing tasks in real-time. It helps to uncover many hidden insights of a user making vacation bookings, which is not possible without having users perform the tasks. Each user was allotted a slot of 30 minutes for the study one after another. The users were briefed about the objective of the study and what they were going to do as part of this study. Each of the users was presented with the same four tasks to perform on the 'MakeMyTrip' application. These tasks included important aspects of vacation planning and are as follows:

Task 1: Booking a budget-friendly vacation package.

Task 2: Booking the cheapest flight ticket.

Task 3: Booking a hotel room.

Task 4: Booking attractions and activities.

Each of the tasks were explained well in details like the date for which the bookings were to be made, for which location and other essential details. After performing the tasks, each user had to go through a short interview where questions about the tasks and their experiences were asked. In addition to this, users were asked some more questions about vacation planning in general which included booking cabs, flights, and packages. Users were also told about think aloud technique which they could use while performing the tasks. However, thinking aloud was an optional practice. One researcher was dedicated to noting down the observations when users were performing the tasks. Initially, empty coding sheets were prepared for each of the user having the tasks and unanswered questions. These coding sheets were used by researchers to note down the observations.

Results and Discussion

During the study, one of the users used think aloud technique and gave many interesting insights about how users perceived the tasks. It was observed that all of the users were able to complete their tasks and interview within 30 minutes. After the end of the study, we had 3 coding sheets. Each of the coding sheets had the observations made by the researcher and the answers given by a particular user. All of the users were able to complete all tasks however, each one of them found themselves lost when finding activities and attractions. Refer to the figure to view the top observations from each task

	Observations
Task 1	Users used filters to narrow down the packages further. However, they didn't find not too many choices to choose from. Users felt less flexibility in the system.
Task 2	Users found it very easy task to do and each of them used filters to find flights of their choice.
Task 3	Users took time to do the hotel booking. There were a lot of choices, and they did take time before finalizing one.
Task 4	Users weren't able to find activities tab initially. Users initially thought that app doesn't facilitate activities booking. Later, through the search bar they were able to find activities section.

Table 1: Tasks observations in contextual inquiry

After that, Affinity Diagramming technique was used to process the ideas in coding sheets further. Answers to the questions and observations were converted to sticky notes. Each of the sticky note were written in a way that every note was self-explanatory and held the context in which it was said. Sticky notes from all three coding sheets were prepared. Later these notes were used to do three rounds of refining and similar notes were placed under same cluster in each round. At the end of three rounds, there were 6 clusters formed each of them representing one theme as shown in the figure.

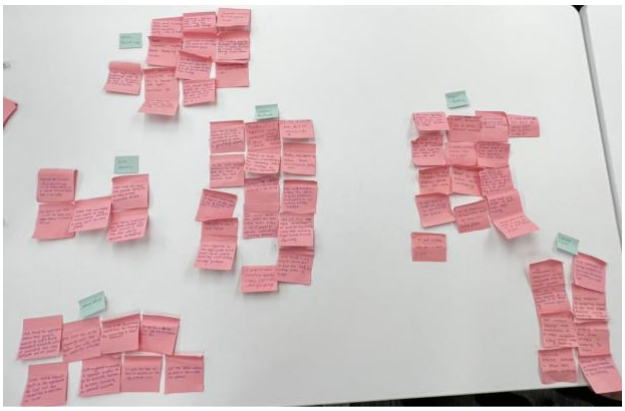

Figure 1: Affinity diagram last round result.

The six themes that were found are – Flight booking, Attraction, Cab booking, Holiday Packages, Hotel Booking, and Overall flaws. To learn more about these themes refer to figure.

Theme	**Description**
Flight Booking	Booking flights for various purposes using smartphone app from one destination to another for a vacation.
Attraction	Booking site visits, attractions and activities and providing suggestions for them for a vacation trip.
Cab Booking	Providing cab booking services at a vacation destination or to the destination.
Holiday Package	Providing holiday packages which includes flights, hotels, cabs, airport transfers, sight-seeing etc.

Hotel Booking	Providing service to book accommodation at a vacation destination.
Overall flaws	Flaws which were found in most of the above themes.

Table 2: Themes found in affinity diagram.

There were multiple suggestions for improvement in the existing features. Some of the top suggestions are as follows:

- Giving users an option to specify depart after and arrive by time for flights.
- Allowing customization of holiday packages by giving users the option to choose the number of days, 5-star hotel rating etc.
- A way to compare two hotels.
- Activities available on user-provided days.
- Giving basic and advanced filters everywhere in the app to not bombard user with a lot of filters in once glance.
- A way to store and verify visa and vaccination certificates

For the project, out of all the suggestions, three were chosen to be prototyped for this project as mentioned below:

- A new filter for the flights where users will be able to specify depart after and arrive by time which will allow users to find only flights that fly during this specified range of time.
- A new feature that allows user to select two hotels for comparison and users gets a comparison chart between the two hotels.
- A date filter in activity that will allow users to view only the activities that are available for booking on these days.

STUDY TWO

The Design Process

For the design process, we designed the prototypes such that minimal information is present on the screen so that the users don't get overwhelmed and get the task done with minimal number of clicks. We created prototypes for three different tasks which were selected from the previous study.

The prototypes were designed for the three tasks keeping in mind the needs of the user which needs to be fulfilled.

The Prototype

The prototypes were designed for each task for the three features selected from the previous study. We used Balsamiq [13] tool to create the low-fidelity prototypes. The prototypes displayed basic navigation elements and controls such as input fields, buttons, icons, images, etc.

For the new filter for flights where users can filter flights by arrival and departure time, we created four screens. The screens contained covered a full task to filter the flights and it started with entering details like flight type (one-way, roundtrip, and multicity), from/to location, departure and return dates, and the number of travelers as shown in Figure 2.

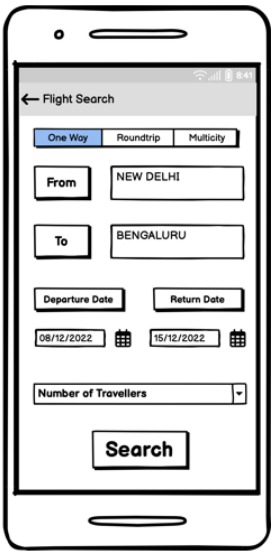

Figure 2. Prototype which asks user details about the flights

The important screen of the first task is the filtering flights screen. As shown in Figure 3, in this screen we ask users for the depart after and arrive by time, the price range for the flights, air lines they prefer and a submit button.

Figure 3. Prototype to filter out flights.

For the second feature, the task was designed to filter out activities by dates. We designed five prototype screens for this task.

The prototype screen most important to this task is the filtering screen (shown in Figure 4) where the user can filter out activities by categories, and dates (to/from) and the price range for the activities. An "Apply" button is provided so that the user can apply the filters

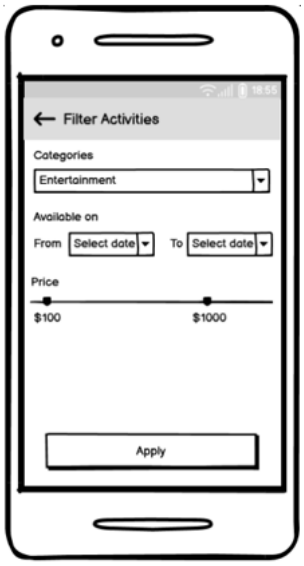

Figure 4. Prototype to filter out activities by dates

For the third feature, the task was designed to compare hotels for various features like price, amenities, distance from airport etc. The prototype screen most import to this task is the comparison screen (shown in Figure 5).

Figure 5. Prototype to compare hotels

As shown in the above figure, the user will clearly be able to compare the hotels. The screen is divided into three columns, the first columns show the features, and the other two columns shows whether that hotel fulfils that feature or not.

Evaluation Process – Cognitive Walkthrough

From study 1's affinity diagramming, eight features were suggested. Three features were selected for prototyping: 1) Flights list based on timings, 2) Filtering activities/attractions based on dates, and 3) Comparing hotels.

To evaluate the low-fidelity prototypes, we went through a cognitive walkthrough with the help of evaluators. Five evaluators attempted to complete the tasks given by us, and at the end of the cognitive walkthrough, all the evaluators decided which issues should be marked as must-fixed.

We made evaluators examine the prototype's usability by guiding them through user persona, task scenarios and use cases. A persona of a Ph.D. student called Abby Jones was assumed.

Five evaluators completed the tasks and with each evaluator, there was a moderator with them which helped them clear the doubts. The moderator did not interfere with the tasks or influenced the evaluators. Two or three evaluators completed the tasks at the same time. Once the tasks were done by all the evaluators allotted for that time slot, the evaluators met and discussed the issues. Must-fix issues were highlighted by the evaluators after the discussion. A pluralistic approach was followed for this cognitive walkthrough.

Result and Discussion

After the cognitive walkthrough, several issues were discovered. As shown in Table 3, for the first task, a total of six issues were discovered, and five of those issues were marked as *must-fix* issues. Seven issues were discovered for the second task, to filter activities according to a specific range of dates, and one of the issues was a *must-fix*. Six issues were discovered for the third task, and three were *must-fix* issues.

Task Number	Total Issues	Must-Fix issues
Task 1	6	5
Task 2	7	1
Task 3	6	3

Table 3. Tasks and their total issues and must-fix issues.

Task Number	Cumulative Cost
Task 1	7
Task 2	8
Task 3	7

Table 4. Tasks and their respective cumulative costs.

From Task 1, as shown in Table 3, five must-fix issues were found. Each of them was given the same priority rank and the resolution was to fix them immediately. Most of the issues were related to missing input fields or a correct action being unavailable which may confuse the users. The cumulative cost of all the must-fix issues in task 1 was 6.

For Task 2, as shown in Table 3, only one must-fix issue was reported. The issue was the user will not know how to open a hotel to view its details (select a hotel from a list of hotels). The solution was to add a "View Details" button/hyperlink for each hotel so the user can know the correct action.

For Task 3, as shown in Table 3, three must-fix issues were found. The cumulative score of all the must-fix issues was 3 and they were all given a priority rank of 1. One of the issues was reported in the hotel comparison screen where there was no action available for the user to do. The expected next action would be to book the hotels. The solution was to add "Book" buttons for each hotel in the comparison view.

Discussion

The low-fidelity prototypes we created had several issues in terms of usability. We can improve the low-fidelity prototypes by focusing more on affordances [15] and Nielsen's Heuristics [16].

Keeping affordances [15] in focus can help us design more easy-to-learn and inviting prototypes. For example, cognitive affordance could be applied to use local date formats while selecting dates for booking flights, filtering activities, or booking hotel stays. Physical affordance can be used to improve the accessibility of the application, e.g., making book and filter buttons big enough.

Similarly, Nielsen's Heuristics [16] could be followed to improve the UX of the application. For example, once the user adds a hotel for comparison, the application can show a message which says that the hotel has been added to comparison (Visibility of system status). Providing a back button everywhere could also help users to go back from any screen they didn't intend to be in (User control and freedom).

CONCLUSION AND FUTURE WORK

Planning a trip is not about going to a destination, it involves cognitive thinking like booking a flight, booking a convenient accommodation, knowing about the activities happening around the destination place and much more. Not considering any single thing will lead to a bad experience where a person would not be able to enjoy the trip fully. Therefore, while going on a vacation proper planning and making an itinerary plays a crucial role. As we have seen, nowadays, there are tons of applications which help the user to plan a trip just at their fingertips. After reviewing the top applications, we decided on MakeMyTrip as the foundation of our project. MakeMyTrip is an all-around application that provides everything a person needs to plan a trip, such as booking a flight by recommending standard as well as cheap flights, booking hotels by applying filters that will help user to book a convenient stay as per their needs, helping users to know as well as top activities happening around, and much more.

As we have selected a base application, we conducted a context inquiry with some user tasks to perform by 3 participants. After completion of task, participants were asked to answer some interview and post-interview questions which helped us to get an idea about how users felt about the current system. As a result, we received a large amount of qualitative data from all of the participants in the form of ideas and recommendations (Refer to Table 1), which led us to use the Affinity Diagramming Technique, in which each of us created a self-explanatory sticky note. We grouped similar notes together and formed clusters and extracted six themes: Flight booking, Attraction, Cab Booking, Holiday Packages, Hotel Booking, and Overall flaws. We selected flight booking, attraction booking, and hotel booking as themes to consider from the extracted themes.

After reviewing the recommendations and flaws in the selected themes, we introduced some new changes that will help to eliminate problems that users are experiencing with the current system, which are a new filter that allows users to specify "Depart After" and "Arrive By" times when booking flights, a chart that compares two hotels based on price, amenities, location, and much more when booking hotels, and a filter that allows users to filter out activities that are happening on the same day when booking hotels. Furthermore, we created some low-fidelity prototypes that incorporate all the new changes to the existing system.

As low-fidelity prototypes were in hand we conducted a Cognitive walkthrough to evaluate the prototypes based on its usability. For that, we made 5 evaluators evaluate our protypes by guiding them through user persona (Abby Jones), task-scenarios and use-cases and asked them to fill the cognitive walkthrough sheets in the end. We discovered that Task-1 has five must-fix issues with a cumulative cost of seven, Task-2 has one must-fix issue with a cumulative cost of eight, and Task 3 has three must-fix issues with a cumulative cost of seven. The main problems in Task 1

involved the absence of input fields, while in Task 2 the users' confusion over the button and in Task 3 there was no action available for the user to take after viewing the comparison chart.

In the future, we intend to address all of the must-fix issues in prototypes. After resolving them, we intend to repeat the process with a larger number of participants, conducting contextual inquiry, designing prototypes, conducting cognitive walkthroughs, and improving the prototypes. Following that, we will create high-fidelity prototypes based on Neilsen's Usability Heuristics [14] from the enhanced low-fidelity prototypes, which will help us connect functional and emotional affordance as we introduce the functionality of each button and add colours. This is how we intend to make our design more user centric.

REFERENCES

[1] Jung, Dooseon and Cho, Mi-Hea, "A Discovery of the Positive Travel Experience in Pre-Trip, On-Site and Post-Trip Stage" (2015). Travel and Tourism Research Association: Advancing Tourism Research Globally. 2. https://scholarworks.umass.edu/ttra/ttra2015/Qualitative_Research_Methods/2

[2] Wen-Haw Chong, Bing Tian Dai, and Ee-Peng Lim. 2015. Not All Trips are Equal: Analyzing Foursquare Check-ins of Trips and City Visitors. In Proceedings of the 2015 ACM on Conference on Online Social Networks (COSN '15). Association for Computing Machinery, New York, NY, USA, 173–184. https://doi.org/10.1145/2817946.2817958

[3] Brightspace, "Lecture1_ContextualInquiry", *Brightspace.com*. [Online]. Available: https://dal.brightspace.com/d2l/le/content/230470/viewContent/3294238/View. [Accessed: 08-Dec-2022].

[4] TripAdvisor, "Trips: Tours and Tickets", *Tripadvisor.ca*. [Online]. Available: https://www.tripadvisor.ca/Attraction_Products-g189970-d8774929-Trips-Reykjavik_Capital_Region.html. [Accessed: 08-Dec-2022].

[5] "MakeMyTrip", *Makemytrip.com*. [Online]. Available: https://www.makemytrip.com/. [Accessed: 08-Dec-2022].

[6] "GoIbibo", *Goibibo.com*. [Online]. Available: https://www.goibibo.com/flights/. [Accessed: 08-Dec-2022].

[7] "Travel with expedia.ca: Vacation homes, hotels, car rentals, flights & more," *Expedia.ca*. [Online]. Available: https://www.expedia.ca/. [Accessed: 08-Dec-2022].

[8] Damianos Gavalas, Vlasios Kasapakis, Charalampos Konstantopoulos, Grammati Pantziou, Nikolaos Vathis, and Christos Zaroliagis. 2014. A personalized multimodal tourist tour planner. In Proceedings of the 13th International Conference on Mobile and Ubiquitous Multimedia (MUM '14). Association for Computing Machinery, New York, NY, USA, 73–80. https://doi.org/10.1145/2677972.2677977

[9] Ivan Burmistrov. 2009. Mobile air ticket booking. In European Conference on Cognitive Ergonomics: Designing beyond the Product --- Understanding Activity and User Experience in Ubiquitous Environments (ECCE '09). VTT Technical Research Centre of Finland, FI-02044 VTT, FIN, Article 11, 1–5.

[10] Sheng Wang, Mingzhao Li, Yipeng Zhang, Zhifeng Bao, David Alexander Tedjopurnomo, and Xiaolin Qin. 2018. Trip Planning by an Integrated Search Paradigm. In Proceedings of the 2018 International Conference on Management of Data (SIGMOD '18). Association for Computing Machinery, New York, NY, USA, 1673–1676. https://doi.org/10.1145/3183713.3193543

[11] L. Day, "8 benefits of planning a trip in advance," *Goaheadtours.com*, 20-Jan-2022. [Online]. Available: https://www.goaheadtours.com/travel-blog/articles/benefits-of-planning-a-trip-years-in-advance. [Accessed: 08-Dec-2022].

[12] "Balsamiq. Rapid, effective and fun wireframing software," *Balsamiq.com*. [Online]. Available: https://balsamiq.com/. [Accessed: 08-Dec-2022].

[13] "Balsamiq. Rapid, effective and fun wireframing software," *Balsamiq.com.* [Online]. Available: https://balsamiq.com/. [Accessed: 08-Dec-2022].

[14] J. Nielsen, "10 usability heuristics for user interface design," *Nielsen Norman Group*. [Online]. Available: https://www.nngroup.com/articles/ten-usability-heuristics/. [Accessed: 08-Dec-2022].

[15] "Lecture 2," Brightspace.com. [Online]. Available: https://dal.brightspace.com/d2l/le/content/230470/viewContent/3293016/View. [Accessed: 08-Dec-2022].

[16] "Lecture 6," Brightspace.com. [Online]. Available: https://dal.brightspace.com/d2l/le/content/230470/viewContent/3337578/View. [Accessed: 08-Dec-2022].