Final Results and Recommendations

Steam

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1 Introduction

1.1 System Description

Steam (https://store.steampowered.com) is the largest digital video game distribution platform for PC, offering a vast variety of games regardless of publishing company or country. Games purchased on Steam are permanently tied to the specific Steam account the purchase was made on and can subsequently be played and transferred across any PC device using that account. The primary function of Steam is to allow users to search for and purchase games, and subsequently organize and access all owned games in one place.

The Steam platform is split into 3 major components: The Store which allows users to purchase games, a "Personal Library" containing all games the user has purchased and can play, and the "Community" which facilitates sharing and various interaction with other Steam users. The Community component was not examined in our evaluation. Steam can be accessed through a web browser or the Steam Application. We will evaluate the Application format as this is the primary point of access for Steam since games can only be launched (played through) here. There are many other digital video game distribution platforms available on the market including Epic Games, GOG, and Origin; however, Steam is by far the largest, most extensively developed, and used.

The target population for Steam is a very large, unspecific demographic that can only be described as "Gamers", or anyone who might play a video game on their computer. General demographic features such as age, gender, ethnicity, or occupation are not applicable as Steam users are fairly uniform across all these areas. Steam's user population also does not have any specific set of skills (technical, professional, or otherwise) outside of a basic ability to utilize a computer. However, if a study were to be done, it would most likely be found that a significant component of Steam users possess a medium to high competency with computers.

1.2 Purpose, Goals, and Objectives

Overall Objectives

To evaluate the overall effectiveness of the Steam platform, specifically functions within the Store and User Library sections. These two areas were chosen as they are the most representative and important functions within Steam as it is first and foremost a store aiming to sell products and tied to that allow users to access those products. We hope to assess how easy it is for users to perform the critical functions associated with these purposes including searching and purchasing in the Steam Store and Collection creation in the Game Library. In addition, we would like to identify what features are more frequently used in the Steam Store, as well as what areas users like or dislike.

Research Questions:

1. Our heuristic evaluations found that there are many ways a user could search for games. We decided to investigate the user paths taken to search for a game given their starting point and different search needs: 1. Specific game in mind, 2. Browsing for a game within set parameters. Specific questions we wanted to answer here included:
    - For different search tasks, which search feature does the user choose to use as their starting point (search bar vs. browsing my category)
    - How successfully can users search for and find games using either option:
        - Is one more effective than the other (time wise)? Are they successful with it?
        - Is one more prone to errors?
    - What paths are taken (what links clicked)
    - What are the major complaints/difficulties as identified by the user themselves?

All of these questions would reflect how users use the Steam store, what features are used more, and possibly their likes or dislikes.

2. Our cognitive walkthrough also identified that the process for users who wanted to purchase multiple games at the same time was more difficult and tedious as you have to restart your search from the start each time after

adding something to cart or use the back button. Therefore, we wanted to evaluate user feedback regarding this process and gather their opinion on how they might prefer it should work.
- See how they perform the repetitive task (do they use the actual buttons Steam provides)
    - Does the button function as users expect? What would they want these buttons to do?
- User opinion on the usability of current purchasing function
- User suggestions on how interface can better support their needs

These questions are mostly qualitative in nature and simply explore if the users feel there is a problem with the current interface related to purchasing games.

3. Heuristic evaluations also found that it might be difficult for new and experienced users alike to create "Collections" and customize their dashboard in the Personal Game Library section of the Steam platform. We wanted to test this specifically as well and answer these questions:
    - Is the "Collection" creation feature intuitive to users?
        - Do they know what it is for? When to use it?
        - Do they know how to initiate the process?
    - What are the major barriers users face when trying to customize/sort their game library?
    - Do users like the layout of their library and what would they change?

These questions directly address our concerns regarding the "Collection" creation function and general ease of use of the Steam Personal Library.

2 Methodology

2.1 Participant Characteristics

Choosing the right participants will be very important for our user-testing plan. We chose participants resembling the quality and characteristics of actual Steam users. So, our three participants do some level of gaming and are within the age group of 18-54 since majority of gamers in the world come from this age group (which is 64% according to Statista.com). We did not want to target any specific subset of the Steam population and aimed to be as diverse as possible in our participant selection given limited circumstances. Given the broad nature of Steam's target population, our only exclusionary criteria was that participants have familiarity with computer use; reflecting the fact that most Steam users have this characteristic. All participants were members of a team member's household and were contacted directly for participation in the study.

The most important characteristic we screened for was 'prior experience with Steam'. In our search for participants, we made sure to have at least one novice user and one intermediate or experienced participant in order to capture the experience of new and experienced users. This is because during our Heuristic and Cognitive evaluation, the Steam interface seemed to be very confusing and annoying for these users, especially for someone who is not familiar with it. These participants can not only provide the insights and difficulties faced by new users, but also can bring minute details to notice which is generally overlooked by most of the experienced and old users of the platform. While gender was not a defining characteristic of the target population, we included at least one male and one female participant so that we can evaluate the platforms from both perspectives in order to make our platform equally user-friendly for all the users.

2.2 Location and Setup

Studies were conducted in a semi-controlled environment within each participants' place of residence. While there is a level of control necessary for the experiment itself, the environment is still largely natural to that which real users would interact with Steam. It is most likely that real users of Steam would utilize the platform from the home & hence is beneficial to the goals of our evaluation as we want to mimic and access the experience of actual users. We were able to conduct a combination of both on-site as well as remote study monitoring of the study proceedings, as each participant shared living environments with one of the team members. However, attendance for other team members for sessions was through a recorded Zoom meeting.

All the participants will be using a Windows computer with the latest version of the Steam Application, along with Zoom online meeting platform installed on the PC. Considering the budget prospects in testing and evaluation, the participants will be using one of our tester's account of steam platform which has pre-installed games to perform the user test and analysis. The participants will be asked to share their screen on the zoom platform to all the testers and the meeting will be recorded using zoom as well. There will be at least 2 mobile phones used (one for backup) for both audio and video recording of the participants to ensure we have a backup in case of connectivity issues.

To conduct the test, each participant would be provided with: the computer with test environment already set up, print out of a participant aid sheet (Appendix D), table and chair, a notepad and some stationary items for them to take any notes or draw any design during the test which they would like to share with us afterwards. Each participant would be provided with a power outlet so that the session is not interrupted due to battery drainage. Other set-up materials include: physical or digital consent forms for signing (Appendix A), pre-test & post-test data collection sheet (Appendix B), task data collection sheets (Appendix C), and a script for primary moderator (Appendix E).

2.3 Design

This usability test will be exploratory to understand what common paths and main obstacles are when users search, purchase and create a collection of games. We used a within-subjects design, meaning all participants will be completing the same three tasks. As each task assesses a distinct function within Steam or interacts with a different part of the platform, we did not feel that measures like counterbalancing were needed. Due to the restrictive circumstances and nature of virtual experiments, we could not use a larger sample size to improve sample representativeness. While participants were conducting the given tasks, we collected their behavioral data, completion rate, time to complete, and the number of errors that participants would made throughout observation and solicit their subjective feedback on a post-test questionnaire.

2.4 Procedure

Each usability test session will be approximately 30-minutes-long (based on a test run), however we allocated 60 minutes for each session to account for unexpected circumstances. Participants will take part in the usability test via remote screen-sharing technology. The participant will be seated at their workstation in their personal home environments. The participant's interaction with the Steam App will be monitored by all team members remotely via Zoom. Data recording will be done on physical paper and electronically into data collection sheets (Appendix C) during each session and post session through watching recordings where necessary.

The primary moderator of each session will largely follow a prewritten script for all their verbal instructions to participants (Appendix E) during the administration of the usability test. As everything is virtual and studies are taking place in the participant's place of residence, no specific procedures were specified for entry and exit of study location. Initiation of a study session occurs when participant sits down in front of the set-up computer Once started, all sessions will proceed according to the following stages:

1. **Introduction to the session:** The moderator will brief the participants on the Steam App and make clear to the participant on what the study's goals and objectives are. Participants will sign an informed consent form (Appendix A). The moderator will ask the participant if they have any questions. Recording of the Zoom call begins immediately after consent forms are signed. (5 minutes)
2. **Pre-test and background questionnaire:** Participants will complete a pretest demographic and background information questionnaire (Appendix B). (5 minutes)
3. **Tasks:** Task specific instructions will be given to the participant. Once participant understanding is verified task will commence following its guidelines. (15-20 minutes)
4. **Post-test questionnaire:** After each task, participants will complete a post-test questionnaire (Appendix B). (5 minutes)

2.5 Test Moderator's Role

All members of the team were assigned a role during each study. Two distinct roles were defined as follows, and assignment to each role during each usability test vary by participant. No additional observers were present during the study.

Primary Moderator / Facilitator (Team member who is present in the room with participant)

- Participant's main point of contact and interaction
- Sets up computer and study space prior to study start
- Provides all appropriate materials to participant at the start of the study
- Administers all parts of the study to the participant through strict following of a predefined script
- Allowed to provide mild encouragement for participants to verbalize and answer participant questions as appropriate but otherwise not interfere
- Monitor and record notable participant physical reactions including expression where possible

Data logger / Observer (All other study members)

- Fills in data collection sheet during the study
- Records participant's actions and comments
- Assists in identifying problems, concerns, coding bugs, and procedural errors during the study and help resolving technical issues
- Is a silent observer during study proceedings unless specifically needed

2.6 Tasks

<u>The usability test was broken into the following three tasks:</u>

1. **Search for games in the Steam Store, which was further broken into two subtasks:**
   A. Searching for a specific game for which the name was known
   B. Searching for any non-specified game which meets specified criteria

Participants started on the Steam Store homepage (Figure 1) in both subtasks, with three anticipated directions to start from to carry out each task (Figure 1, indicated in red). In subtask two we specifically anticipated that participants would eventually reach the search results screen (Figure 2) and use the filter functions (Figure 2, indicated in red).

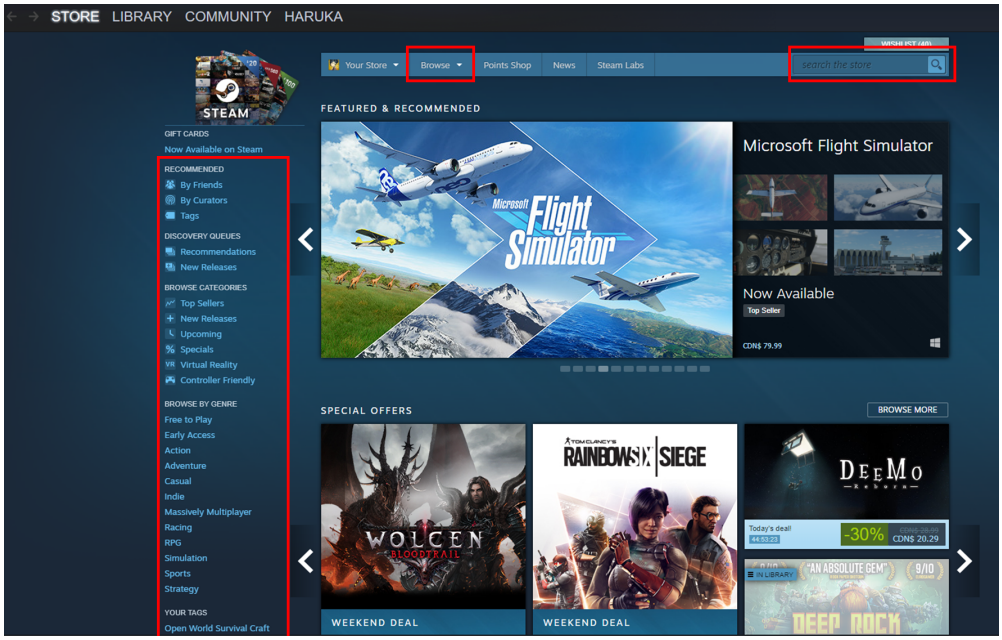

Figure 1: Task 1-a, Steam Store Homepage

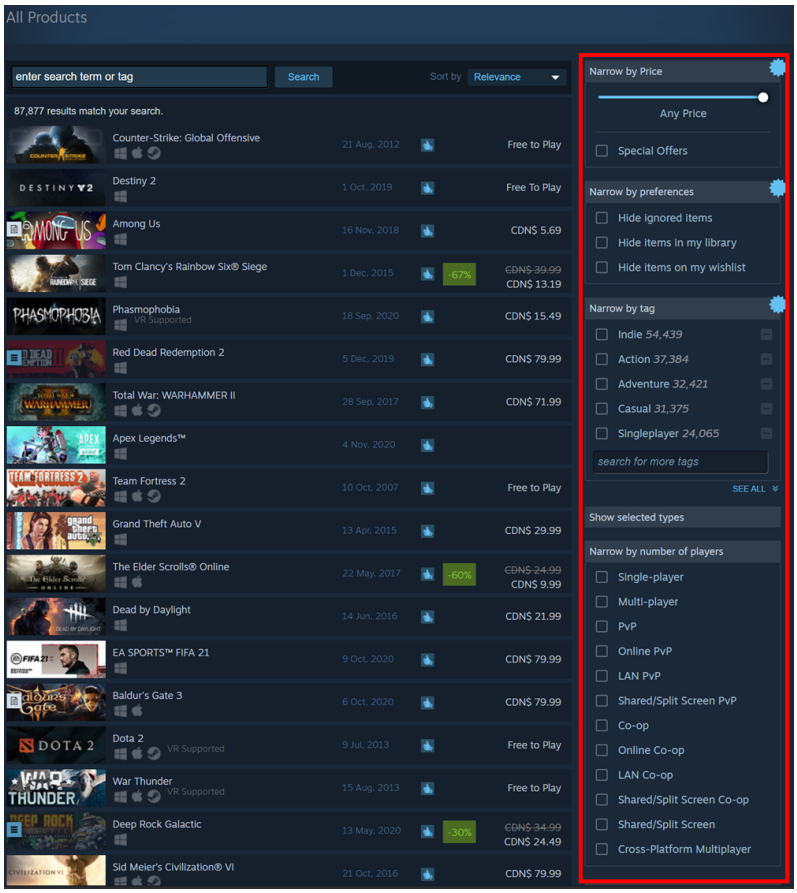

Figure 2: Task 1-b, Search results screen

2. Selecting multiple games from the Steam website and adding them to the cart

In this task, we wanted users to experience the scenario where they had several games they wanted to purchase at the same time and were trying to add them all to the cart. In order to eliminate searching ability factors from this task, we showed participants specifically what three games they had to purchase and how to get there (Figure 3, indicated in red), through a demonstration using the search bar. We then wanted to see if users utilized Steam's built in "Continue shopping" button from their cart screen (Figure 4, indicated in red) or their own variation to continue searching.

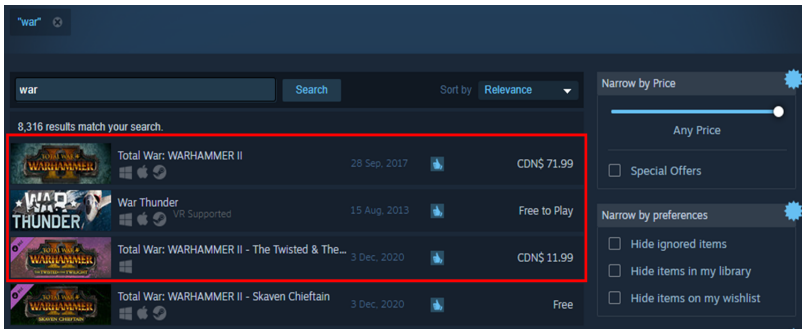

Figure 3: Task 2, demonstration of what three games to purchase

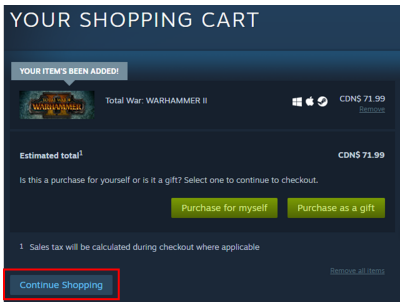

Figure 4: Task 2, Shopping cart screen

3. Creating a Game Collection in participant's library

Participants started in a prepopulated Personal Game Library home page. They were shown what a "Shelf" is (Figure 5, indicated in red) and asked to create a Shelf per the specified parameters of the task. This task had two major milestones including finding out how to create a Shelf and accessing the options to customize it (Figure 6,

milestone 1), followed by realizing the need to create a Collection and subsequently creating it (Figure 6, milestone 2). There are multiple ways to complete milestone 2 of this task & Figure 6 is depicting the most direct and shortest path.

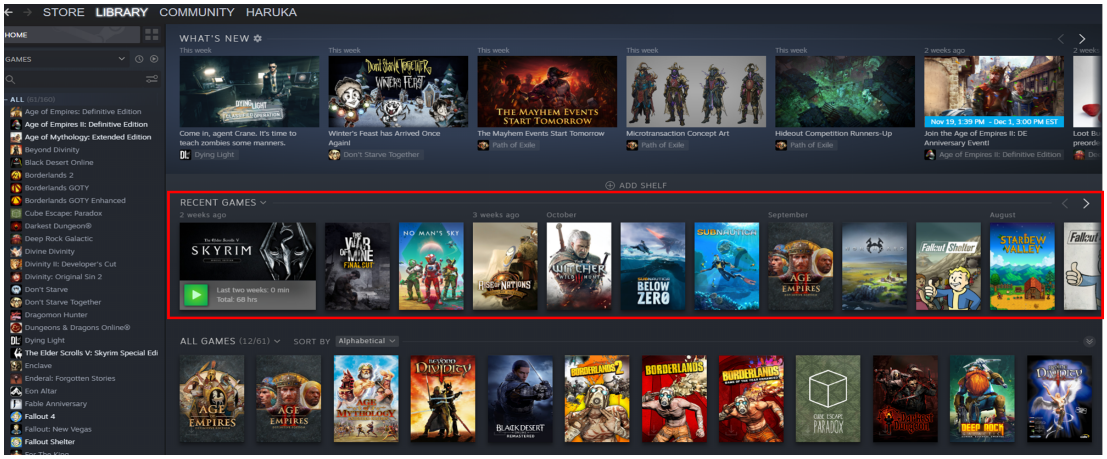

Figure 5: Task 3, Personal Game Library home page

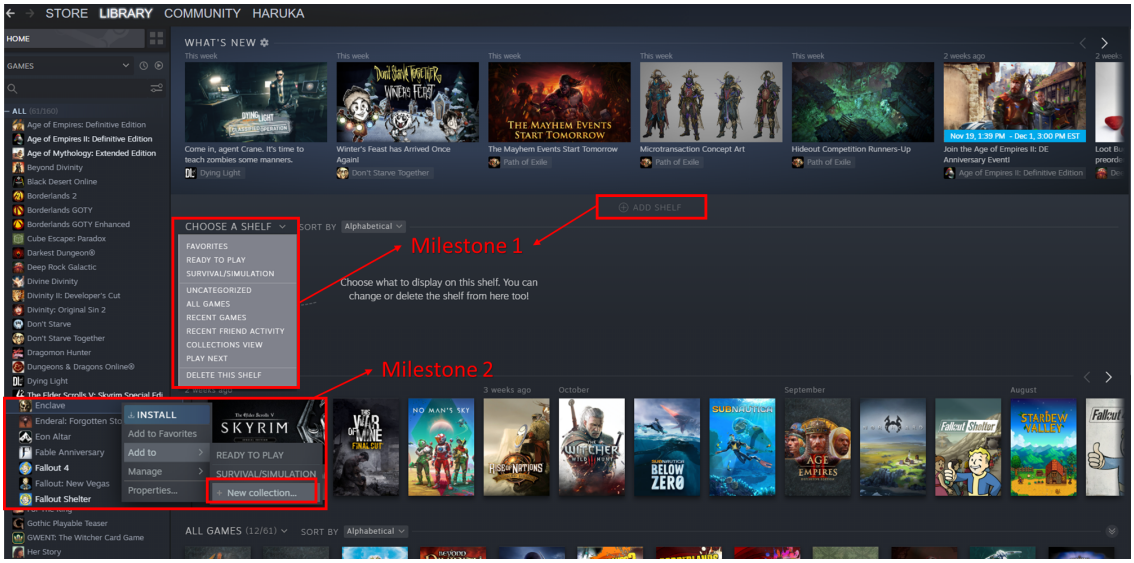

Figure 6: Task 3, Creating New Shelf & Game Collection milestones

These three tasks were chosen for the usability test as they are the most representative of the primary functions of Steam and most likely use cases for any Steam user. We ordered our tasks to follow a logical user interaction with Steam, first searching for a game, then adding games to cart for purchase, and finally organizing purchased games in their Personal Library.

Table 1. Task 1: Search for games in the Steam Store

Task Name	Search for games in the Steam Store
Task Description	This task is broken into two subtasks. In each subtask the participant is given a hypothetical scenario for which they wish to search for a game in the Steam Store. 1. The participant searches for the specified game given the title a. Game Title: "Dragon Age Inquisition" b. Time Limit: 1 min 2. The participant uses the browse feature to find a game based on the criteria a. Criteria: Price = "On sale" + "Under $20", Genre = "Strategy", User Review = "Very Positive/Positive", Language = "English" b. Time Limit: 3 mins
Material	- The Steam desktop application installed on the computer and open - The application will be logged into a premade test account - Participant Aide Sheet Section 1 (Appendix D)
Machine State	- Access to internet on the computer on which the task is being conducted - Start with Steam App opened to the Store home page - Logged-in status is not required in this task but recommended
Success Criteria	Since this task is divided into two parts, we will record success of each part separately, participant must complete the following before the set time limit to be considered successful: 1. Upon landing on the page for the game "Dragon Age Inquisition" 2. Upon selection of any game meeting specified criteria, and participant indicating to primary moderator they are finished (to minimize random selections/guesses)
Benchmark	- Participants have until the time limit of 1 min and 3 mins respectively to complete each subtask - Any completion of task after this time limit is considered a failure of the task - If participant indicates they cannot / do not know how to proceed with the task, this will also be considered an automatic failure

Table 2. Task 2: Adding Multiple Games to Cart in the Steam Store

Task Name	Adding multiple games to cart in the Steam Store
Task Description	The main objective of this task is to evaluate the user experience surrounding the consecutive purchasing of multiple games (adding them to cart). - Participants will be given a specific search term "War" to type into the search bar and required to add the first three results to their cart. - Time Limit: 3 mins
Material	- The Steam desktop application installed on the computer and open - The application will be logged into a premade test account - Participant Aide Sheet Section 2 (Appendix D) - We will be providing a brief demonstration of the exact search and three items they will need to add to cart (as the search aspect is not the focus of this task)
Machine State	- Access to internet on the computer on which the task is being conducted - Start with Steam App opened to the Store home page - Logged-in status is not required in this task but recommended - Shopping cart is cleared of all items
Success Criteria	- Participant adds the three specified games to their cart, and land on the billing/purchasing page - It is before the set time limit
Benchmark	- Participants have until the time limit of 3 mins to complete the task - Any completion of task after this time limit is considered a failure of the task - If participant indicates they cannot / do not know how to proceed with the task, this will also be considered an automatic failure

Table 3. Task 3: Creating a Game Collection in participant's library

Task Name	Creating a Game Collection in participant's library
Task Description	Participants will be asked to customize/sort their Personal Game Library but creating a new Shelf titled "Action" with three specific games in it. - Shelf Title: Action - Games to add: Counter Str

	Creation of a "Collection" is a necessary step before creating a shelf with the correct content. We evaluate if the participant can come to this conclusion on their own, however we built in this information as a hint to be given at 1 min if participant has not progressed beyond this point. To successfully complete the task participants must: - Realize shelves display collections - Create a collection called "Action" with specified games - Add a new shelf and select the "Action" collection to display - Time Limit: 4 mins; Hint at 1 min
Material	- The Steam desktop application installed on the computer and open - The application will be logged into a premade test account - Participant Aide Sheet Section 2 (Appendix D) - Participant will be given a brief introduction to the Personal Library, pointing out what a "Shelf" is and shown the default shelf Steam provides all new users - The account will be populated with 5-6 games which can be used to add to the Collection
Machine State	- The testing machine must have the Steam application installed and open - Must be logged-in to premade test account - Start on the "Library" homepage - Premade account must have 5-6 games already present in the library - Default Steam shelf present in Library - No other premade collections or other shelves present in Library
Success Criteria	- Participant creates a collection called "Action" containing the three specified games and displays the collection on a new shelf - It is within the set time limit - If hint is required for progression this will be noted for analysis but still considered a success if they are able to complete the remainder of the task
Benchmark	- Participants have until the time limit of 4 mins to complete the task - Any completion of task after this time limit is considered a failure of the task - If participant indicates they cannot / do not know how to proceed with the task, this will also be considered an automatic failure - Whether or not the hint is required for progression will be specifically noted but not impede overall success of the task

2.7 Measures

The following measures described will be collected from each of the above three tasks:

Table 4: Quantitative Measures Used During the Usability Test

Quantitative Measures		
Measure	**Unit**	**Description**
Success	Yes / No	Whether or not the participant was successfully able to complete the task, big indicator to if Steam supports users doing the function being assessed
Number of Errors	# clicks	Records number of times participant clicks on something that does not lead them towards the completion of the task, or takes them away from completion of the task and can be: - Number of wrong clicks (ex. Irrelevant feature) - Number of back button clicks undoing a mistake Averages will be calculated as part of analysis. High number of errors are a red flag for system usability and indicate need for change.
Total Clicks	# clicks	The total number of clicks it takes participants to complete each individual task. Averages will be calculated as part of analysis and compared to an "optimal" number to evaluate system effectiveness.
User Path	Click path	What path/functions/areas the participant uses to complete each individual task, recorded based on what they click on. This will be generalized and analyzed according to the specific objectives of each task. (Specifics in Appendix C) 1. Identify what search function participants start with, indicating preference of functionalities 2. Identify if participants interact with Steam's built in "continue shopping" feature or if it is ignored and back button is used, indication of unnecessary functions/poor design 3. Determine if participants can recognize the need for, then find the "collection" creation button, as well as where they expect this function to be. Will indicate if this function is

		intuitive or user friendly.
Completion Time	Minutes	The time it takes a participant to complete each individual task. Will indicate overall difficulty of the task reflecting ease of use for the system. Averages will be calculated as part of analysis.

Table 5: Qualitative Measures Used During the Usability Test

Qualitative Measures		
Measure	**Unit**	**Description**
Mouse Movement	Descriptive	Observation of the type of mouse movement the participant makes, to be used to identify possible confusion in how to accomplish task or possibly difficult to navigate interfaces. Specific things to observe might include: - Decisive/wandering movement - Fast/regular/slow movement
Verbal Comments	Transcript	Record of verbal statements made by the participant while completing each task. Comments voiced may indicate expectations of the system that are met or not met, as well as general logic and though process for the task.
Physical Cues	Descriptive	Record of any notable expressions or body language participant displays while completing each task. Observations may indicate which areas participant struggles with or where there is confusion.
Ease of Use Rating	Likert Scale	A scale will be provided to the user to determine how easy the interface is to use. The scale we will be using would be from 1 - 5; 5 being extremely easy to use and 1 being Extremely difficult to use (Appendix B).
Effectiveness Rating	Likert Scale	A scale will be provided to the user to determine how effective the interface is to use. The scale we will be using would be from 1 - 5; 5 being extremely easy to use and 1 being Extremely difficult to use (Appendix B).
Most Liked	Transcript	A user statement about what they liked the most about the steam interface for doing this task, and if they have any suggestions. Free text just a record of what they say. This question will be asked after each task.
Least Liked	Transcript	A user statement about what they liked the least about the steam interface for doing this task, and if they have any suggestions. Free text just a record of what they say. This question will be asked after each task.

2.8 Data Analysis

The data analysis was carried out in two parts: quantitative and qualitative data analysis. In quantitative data analysis, we compared average total clicks to the benchmark total click if average clicks were significantly higher then this would mean participants are not able to recognize the correct intended path and the system is ineffective/not user friendly. The qualitative data analysis was conducted by chunking common phrases and ideas and matching them out with participants' behaviour during the test.

Quantitative data

Among the measures we employed for this project, quantitative data are:

- Completion time
- Total click
- The number of errors
- Likert scale on Effectiveness
- Likert scale on Ease of Use
- User path

Completion time, total clicks and the number of errors
When it comes to the completion time and total click, we conducted descriptive analysis on the test results of these measures and compare them with the benchmark we set. We only calculated mean of each measures given the small number of samples.

Likert scale on effectiveness and ease of use
Participants' perceived effectiveness and ease of use on each task were collective as a Likert scale, 1 being negative and 5 being positive.

User path
When it comes to user path, the common paths that participants took were defined in the analysis phase. After user path of each participant were collected by observation of the study, we revisited the recording to find out missing path and confirm our preliminary findings.

For instance, in the task 1-b, we wrote down every path that users visited along with their verbal comments and color verbal comments in blue and common path in red. The path that two of them took were also identified in the analysis to find out any factors (e.g. participants' prior experience with the steam, usability of the interface and etc.) might influence their choice of the path.

Table 6: User's Click Path with Verbal Comments in task 1-b

Participant	Click path with verbal comments
P#1	"20 dollars.." → browse the local navigation on the left hand -→ browse the tab Browse → but didn't click → scroll down to the bottom of home page → went up to the local navigation again to hover over "tags" (but didn't click)-→ scroll down to the local navigation again → "that's strange" "expecting something here" → wrong click → browse the home page gain → go to search bar → click the search icon → on the search results page → sort by "user reviews" → price filter to 18 dollars-→ filter by English → "weird.." (Realized he forgot to filter by strategy) → type "strategy" on the filter → find the game
P#2	Scroll down the page a bit on the home page → Click the search bar icon → Applied filters on search results → find the game
P#3	Browse tab → strategy → find -→ click → browsing strategy → "I think less then 20 dollars" → press the back button "I can't remember the game name" → find out review / positive review → click other game → try to find a review -→ find the game → "very positive" → "This is the game" → find the game

Qualitative data
The qualitative data that we analyzed are:
- Subjective feedback from post-test questionnaire
- Verbal comments

These data were mostly used to understand the rationale behind the user behavior and come up with the possible improvement for the interface. After the raw data were collected from the session, we found some common comments and group them by relevance. To conduct the more accurate analysis, we also revisited the recorded sessions to understand the context.

3 Results

3.1 Summary of Heuristic Evaluation
In the combined heuristic evaluation of the Steam platform, several interfaces were examined including: The Steam store home page, the search results display, the checkout screen, and the personal game library interface. All of these cover the most basic functions and interactions a typical user would have with the Steam platform. All of

these areas will be examined and summarized equally as they are all closely related to and informed the tasks in our usability study.

Evaluation of the Steam store homepage found some major violations of Neilson's revised heuristic principles, with heuristic H2-4 (consistency and standards) and heuristic H2-8 (aesthetic and minimalistic design) being the most significant infractions. It was found that the navigation and search functions, while present on the page, could be slightly difficult to find and use. Specifically, the browse function which is only a dropdown menu does not seem to have consistently defined categories that a user could easily identify and understand.

Additionally, many of these categories were duplicated in a side menu with inconsistent headings and categories. As the "Browse" option itself was not selectable and selecting the given categories did not then allow additional filters to be applied, we determined that it might be difficult for users who had criteria but no specific game in mind to find what they are looking for. This insight gained led to our extensive testing of the "find a game" scenario used in task 1 of our usability testing, and the inclusion of two separate types of search needs. It was also found that the amount of content on the screen was a bit overwhelming especially for first time users, so in our usability testing we wanted to see how users interacted with the Store homepage and what they try to use on there.

Directly related to the Store homepage's search box function is our evaluation of the results page. The main heuristic violations here were again largely related to H2-4, however this time more in reference to lack of consistency with external expectations and industry standards. Steam uses a unique user rating/reviews icon set and classification when displaying search results, having a thumbs up icon for all positive reviews. On most other platforms this thumbs up image is associated with being a button-users can click to "like" an item. It is unclear why they did not follow the standard five-star rating format to indicate user reviews. Looking at past reviews has a huge impact on any form of online shopping, and we felt that it might be difficult for new users to understand Steam's non-standard icons, and therefore included a step requiring the use of user-ratings in our usability test search task.

The other major violation found in the results list interface closely related with the "checkout/purchase" functions and is a broader issue spanning across several screens. Specifically, we noted that it was quite difficult for users to add more than one game to their cart at once even when all the items they want to purchase appear in the same search. Users cannot "add to cart" directly from the search results list and must click into the individual items in order to add them to cart. In addition to the inability to add multiple items to cart in one go, once an item is added to cart the user is taken directly to the checkout screen. While this wasn't the focus of our original heuristic evaluation of this screen, it should be noted that the "continue shopping" button here is difficult to perceive depending on screen size (have to scroll down) and therefore likely not easily utilized by users. In our usability testing we dedicate task 2 to evaluating user impressions and feedback when having to find and purchase multiple games, in order to determine if the current steam setup meets user needs. Neilson's H2-4 and H2-8 heuristics are once again the focus here as some buttons layout and content on the page lack internal consistency with the rest of Steam, and do not quite meet the needs of users at that stage.

Finally, we evaluated Steam's personal game library page. Here it was found that the majority of heuristic violations were once again mostly H2-4 and H2-8, minor issues related to consistency and design in the interface and its functions, as well as ability to customize different parts of the page. The major problem we focused on here was the ability to create a "collection" (of games), as the main function of the personal game library is to allow users to sort and access their games. The heuristic evaluation determined that it would be quite difficult for users to identify how to initiate the process for creating a "collection", as there is no button to do so directly on the page despite this being a major function. In order to further test this issue we tailored our task 3 to revolve around the creation of a "collection", in order to evaluate if users could find the function, or even know to use it at all.

3.2 Summary of Cognitive Walkthrough

The following table summarizes the action sequence of the cognitive walkthrough, the corresponding findings & how they relate to out user testing. From the cognitive walkthrough conducted, the task 6 & task 7 ("Proceed to

Checkout" & Filling in the Credit Card Information & Confirm") were not testing in the final usability testing as they required the user to actually make a purchase from the Steam store.

Table 7: Summary of the Cognitive Walkthrough

Task	Findings	Observations	Related Usability Task	Relations from the usability testing
Searching for a game in the search bar	Achieved the intended effect	Auto-complete often displays results that may not be relevant. Often takes a while to display the results	Task 1-a	All three participants found it effective & easy to use
Selecting multiple games at once	The correct action is not available	The Steam website does not allow the users to select multiple games at once	Task 2	Participants could not select multiple games at once, repeated sequence for each game
Filter Search results by Genre and Price	Achieved the intended effect	Adjusting specific price range difficult; no manual way to enter price range available	Task 1-b	Participants found it difficult to find the filters; had problems with adjusting the price range
Adding a game to cart	Achieved the intended effect	Clicking the "Add to Cart" button should only add the item to cart, but shouldn't take the user directly to checkout screen	Task 2	Participants were able to add individual games to cart with ease
Click "Continue Shopping" to look for the next game	The correct action is not available	Redirects the user to the home page instead of the expected search results page	Task 2	None of the participants clicked on "Continue Shopping"; expert user knew it doesn't work as intended

3.3 Findings from Usability Test

Findings from the quantitate data analysis

Table 8: Completion time, total click and error clicks

Task	Measure	Benchmark	Participant 1	Participant 2	Participant 3	Mean
1-a	Total Clicks	3	3	3	2	3
	Errors	---	0	0	0	0
	Time	1 min	17 secs	40 secs	14 secs	23 secs
1-b	Total Clicks	7	9	19	6	11.3

	Errors	---	2	3	2	2.3
	Time	3 mins	2.3 mins	2.4 mins	2.22 mins	2.3 mins
2	Total Clicks	9	9	15	12	12
	Errors	---	0	0	0	0
	Time	2 mins	1.49 mins	1.4 mins	1.17 mins	1.35 mins
3	Total Clicks	10	16	14	24	18
	Errors	---	2	1	3	2
	Time	3 mins	1.38 mins	2.3 mins	2.5 mins	2.06 mins

Table 8: Likert scale on effectiveness and ease of use

Task	Measure	Participant 1	Participant 2	Participant 3	Mean
1	Effectiveness	4	5	3	4.00
	Ease of use	4	5	4	4.34
2	Effectiveness	5	5	2	4.00
	Ease of use	4	4	1	3.00
3	Effectiveness	5	5	4	4.67
	Ease of use	4	4	4	4.00

The average total click count was 3, the same as the benchmark in Task 1-a and the average total click was 11.3, 61% higher than the benchmark in Task 1-b. Users rated the ease of use to be 4 and effectiveness 4.34 meaning that they felt that the system was moderately ease-to-use and effective. As we found that the average total click count was significantly higher than the benchmark in task 1-b this means that it was not clear to users how to perform browsing functions, and that Steam's search systems do not fully support non-specific information needs.

In the task 2, users also clicked more frequently than the benchmark; the average total click is 9, 75% higher than the benchmark. They rated the ease of use to be 4 and effectiveness to be 3 meaning that they found the interface moderately easy-to-use and neither effective nor ineffective. Moreover, users completed the task within the given timeframe without error clicks.

In the task 3, the average total click is recorded 10, 55% higher than the benchmark. Even though this is not the highest surge compared to the benchmark, users made several errors during the test and the hint had to be given to finish the task. Users gave Steam high easy-to-use and effectiveness ratings,4.67 and 4.0 respectively, however we note a possible discrepancy between these ratings and the participant's actual experience as evident by higher than benchmark total click counts, indecisive mouse movement, and most significantly the fact that all participants in task 3 required a hint in order to move forward/complete the task. It is possible that simply did not want to give a bad rating, or it is evidence that these setbacks do not have significant impact on a user's experience on Steam.

User path analysis

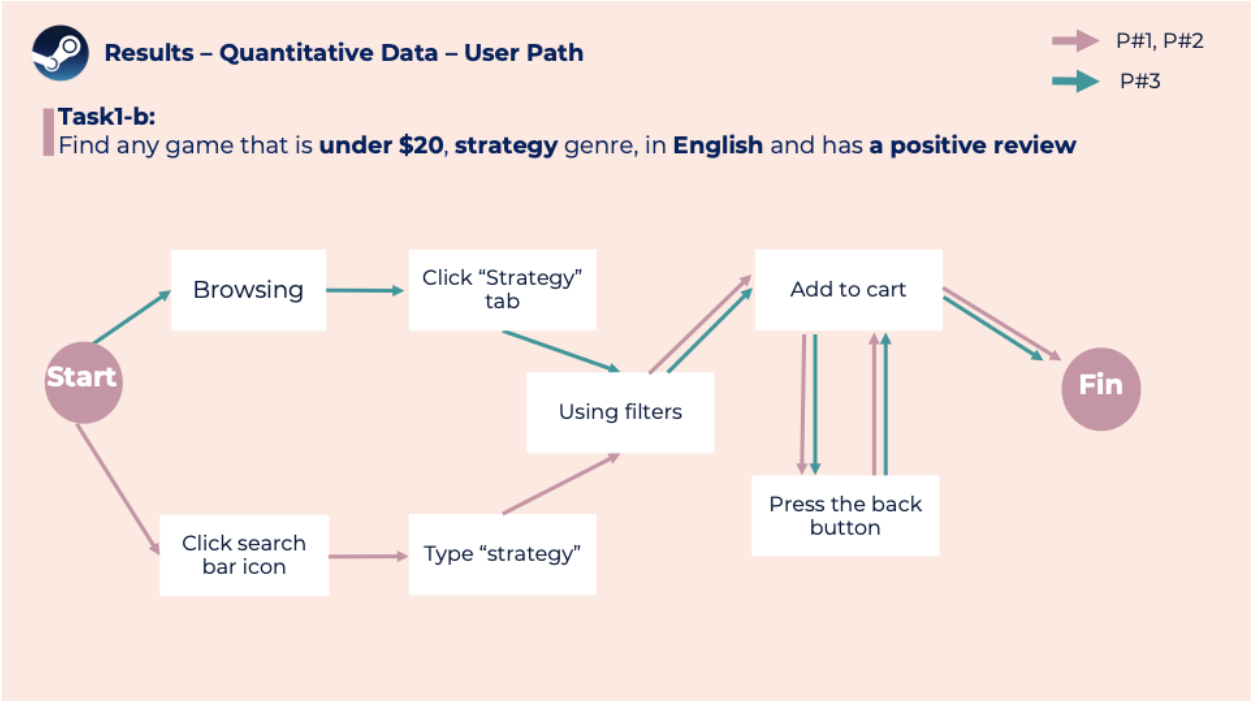

Figure 7: User Path Analysis for Task 1-b

We found interesting findings from user path analysis. In the task 1 and task 3, the user path of all users was the same. However, in the task 1-b and task 2, users choose different paths to complete the task. When it comes to the task 1-b, two users (P#1, P#2) clicked the search bar icon to browse all games and typed "Strategy" in the filter while one user (P#3) went to the browse menu and click "Strategy" tab. However, P#1 and P#2 also browsed the home page by scrolling down to the footer but did not browse the navigation menu as P#3 did. Therefore, we assume that the reason P#1 and P#2 did not go to the strategy tab was simply that they could not know the tab existed. When applying filters to narrow down the search, all participants had difficulty setting the price exactly to 20 dollars as the filter would not allow them to set 20 dollars but only allowed 18 dollars instead. We assume that this is because the price range set on the filter is determined by the games on the search results.

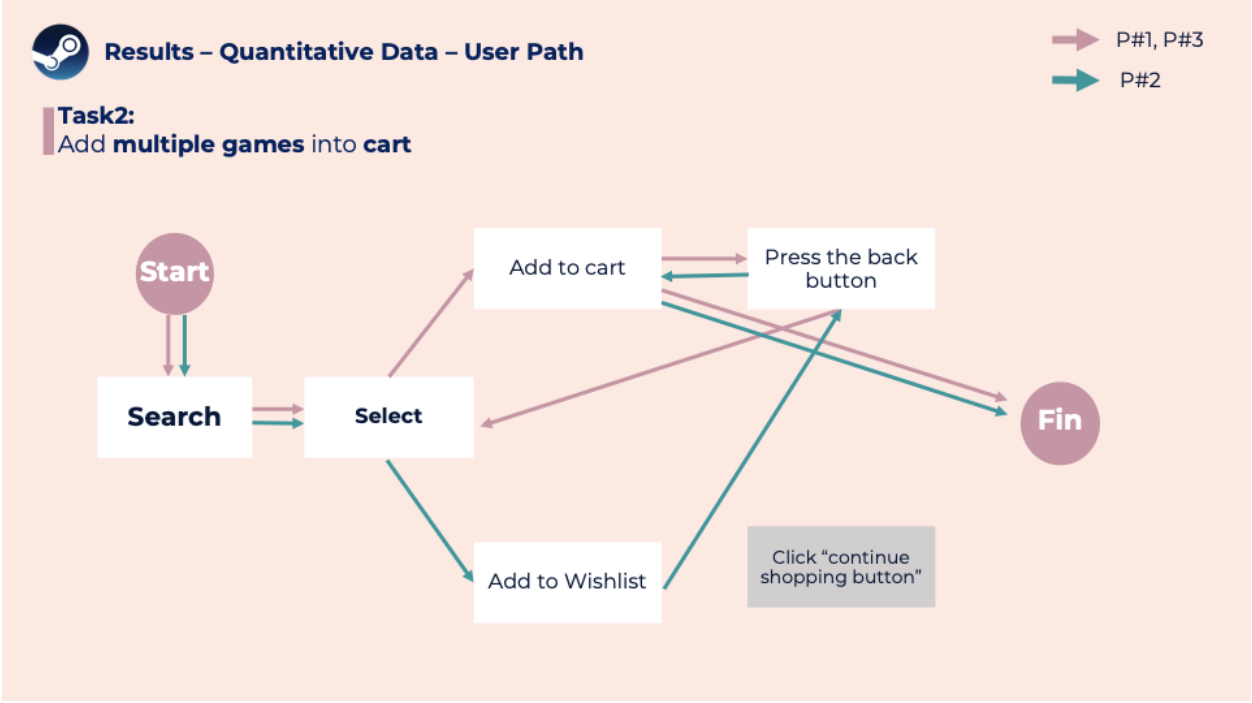

Figure 8: User Path Analysis for Task 2

In task 2, two users (P#1, P#3) completed the task in a very similar way we expected, while one user (P#3) added games into Wishlist first and then moved them to the cart. According to the post-test questionnaire, P#3 thought that the Wishlist and cart would function similarly; the user expected that both features have a check-out process. No user used the "Continue Shopping" button. This is an intriguing finding as one of the reasons we designed this task was to evaluate this button. Since the button takes users to the home page & not to the previous page when clicked, we wanted to assess this user experience is desired for users based on the test findings. However, two users (P#2, P#3) did not realize that the button was provided in the first place and one user (P#1) has experienced with the steam and been a regular user, they knew that the button would not function as expected.

3.4 Recommendations

The following table outlines the Recommendations from our findings from heuristic evaluation, cognitive walkthrough & the usability testing.

Table 9: Problems Identified & the Potential Recommendations

Problems Identified	Description & Potential Recommendations
Improving the user experience (UX) of the website	• Allowing the user to select multiple games at once and add them to the cart • Making the Call to Action of "Continue Shopping" to stand out • Modify the user path of the "Continue Shopping" button; allow the user to go back to the search results page instead of the homepage • Implementing the two most frequently violated Neilsen's heuristics throughout the website (H2-4: Consistency and Standards & H2-8: Aesthetics and minimalistic design) • UX of "add to cart" and "continue shopping" is easy for an expert user but complicated for novice user

Updating the User Interface (UI) of the Website	• Provide an instruction as to how the user can create a collection & a shelf from the "Collection" tab • Make the terminology used to "Checkout" the games more familiar to a first-time user (as it currently uses "Purchase for myself", deviating from industry standards) • Make the tags/filters to narrow the search easily findable • Adding a button on the "Library" page to create a collection

4 Conclusions and Future Work

Conclusions & Learnings from the Usability Tests

For known item searching, the Steam website does a fairly good job as all the three participants were able to find a game when they were provided with the exact name of the game (task 1-a). However, Steam does not provide one obvious standardized way to "Browse" for games, as evident by the fact that participants all took different paths when completing task 1-b, which indicates that the interface's 'browse' and 'filter' features needs to be more user friendly, however all the participants succeeded in completing the task.

None of the participants used 'continue shopping' button for the task 2 and instead used the back button to go to the search page Therefore, the built-in options Steam has provided and likely intended for users to use (i.e., the "Continue Shopping" button) was not used by any of the users, indicating that it is not well designed or does not match the user need. The UI of 'add to cart' and 'continue shopping' are not intuitive for novice users since only participant 1 was able to follow the best suitable path (shortest and simplest) because of prior experience and knowledge of the Steam Interface.

All three participants required a hint as to how they could create a collection and add a shelf to their library in task 3. This indicates that the users do not get a clear understanding of what "Creating a collection" would mean & how they'll create one. Also, considering the high number of wrong clicks in this particular task, it is clear that the process of creating a collection is not easy for the users.

Limitations of the Study

- Due to limiting circumstances, we were only able to test the Steam interface with 3 participants. Instead of conducting one large study with many participants, Nielsen recommends breaking down your study into three smaller studies, with 5 participants each in an iterative manner. Each iteration will help in identifying the problems with the information architecture, the fundamental structure & the task flow of the website.
- Due to limiting resources, we could not test the check-out process since it requires the user to enter the credit card information & actually make a purchase. A future study with more resources could help in the testing of this feature since purchasing of games is something most users would do if they are using the Steam application/website.
- Our study (cognitive walkthrough) identified some issues with the auto-complete feature of the Steam website. However, for the task 1, none of our participants experienced any issues with it. More testing can be done on the auto-complete feature to support/verify our findings from the cognitive walkthrough.
- Our studies from both cognitive walkthrough and heuristic evaluation found issues in the continue shopping feature but we were not able to evaluate that in the usability testing because all the participants chose different paths from our expectations and never clicked on 'continue shopping' although, we expected in our test that we would be able to evaluate the 'continue shopping' feature.
- More participants for testing would help us to aggregate our results and findings from heuristic evaluation and cognitive walkthrough to a greater extent with unambiguous evidence.

- We did not pre-define the success and ratings of different paths for each task, which would have helped us to determine the intuitiveness and complexity in the interface which could be resolved for better ease of use.
- Even though the users struggled with some of the aspects of certain tasks, they tend to rate the ease of use & the effectiveness higher than we expected.

Future Works

- The iterative approach recommended by Nielsen would greatly help in the usability testing of the Steam website
- We counted the number of mouse/keyboards clicks manually for this study
- A UX testing software could have been employed in our study, which would automatically record the user path & the mouse/keyboard clicks they perform during the same
- We didn't touch upon any of the community aspects of the Steam website. In a future study, this area can be explored as well, as the Steam Community allows the Steam users to connect with their friends & indulge in multiplayer games.
- If there's access to how the algorithms of the Steam website work, a future study could also conduct a research on those algorithms & determine on any biases in them.