**Introduction:**

Our Human-Computer Interaction (HCI) design project focused on developing a high school check-in system based on a touchscreen device running MS Windows. The goal of this project is to create a design solution that provides a simple and intuitive user interface for a limited selection of features that allows students to check in quickly and efficiently. In today's fast-paced world, where time is of the essence, a system that streamlines the check-in process can significantly improve the school's overall efficiency and productivity. Our project aims to utilize HCI principles to design an interface that is user-friendly, accessible, and efficient. We will use a user-centered design approach to develop a solution that meets the needs of both the students and the school administration. Through this project, we hope to demonstrate the importance of HCI in designing effective and efficient systems that can simplify complex processes and improve user experience.

1. **Problem research Design description and references to appropriate design and usability theory beyond Task and Error Analysis. E.g. journal and conference papers, theory books, and case studies.**

**Answer:** Design research is a crucial step in the design process, where designers conduct a thorough investigation of the problem domain to better understand user needs and identify potential design solutions. In this context, a range of design and usability theories can be applied beyond Task and Error Analysis to help designers develop effective and efficient solutions that meet user needs.

**User-Centered Design (UCD):** The research problem in terms of UCD is that:

How can we design a user-centered interface for a High School Check-In System that effectively guides users through the check-in process, provides appropriate options for different user types (staff, students, and visitors), and minimizes errors and user frustration?

To address this problem, we will follow the User-Centered Design (UCD) process, which involves understanding the needs and goals of users, developing design alternatives, and evaluating those designs through testing and iteration (ISO 9241-210, 2019). We will also draw on relevant design and usability theory, such as the principles of interface design (Shneiderman & Plaisant, 2010), usability heuristics (Nielsen & Molich, 1990), and the design of error messages (Barker & Gosselin, 2003).

Our design will prioritize simplicity and ease of use, with clear and concise instructions for each step of the check-in process. We will use familiar language and design elements to reduce cognitive load and minimize errors. For example, we will use dropdown menus and pre-populated lists to simplify data entry and reduce the likelihood of typos or other input errors. We will also include error messages and confirmation screens to help users identify and correct mistakes before finalizing their check-in.

To evaluate our design, we will conduct user testing with a diverse group of High School users, including staff, students, and visitors. We will collect both qualitative and quantitative feedback on the usability and effectiveness of the interface, with a focus on identifying areas for improvement and optimizing the user experience.

**Information Foraging Theory (IFT):** The research problem is: how can the interface design of a High School Check-In System be optimized using Information Foraging Theory to facilitate efficient and effective check-in experiences for staff, students, and visitors?

To address this problem our aim is to provide a user-friendly experience for the users, especially visitors who may not be familiar with the school's processes. To achieve this goal, Information Foraging Theory (IFT) can be used to guide the interface design process. IFT posits that users are motivated by the desire to maximize the value of their information-seeking behavior, minimize the effort expended in information gathering, and maximize the information gained from the resources accessed.

The interface design of the High School Check-In System should be centered around the user's goals and tasks, and the system should be easy to navigate. The welcome screen should be visually appealing and provide clear instructions to guide users through the check-in process. The options available to the users (staff, students, and visitors) should be clearly labeled and visible, so users can easily identify the appropriate option.

For visitors, a list of staff names should be available to choose from, and a camera tool should be provided to capture their photos. The photo confirmation step is important to ensure that the visitor's identity matches their photo.

For staff, a list of names should be provided to choose from, and a confirmation step should be included to ensure that the correct staff member is checked-in. Similarly, for students, the check-in process should involve selecting the year group, Form ID, and student name from the appropriate lists.

**Persuasive Design Theory (PDT):** The Persuasive Design Theory (PDT) provides a framework for designing systems that are engaging and motivate users to take action. This research problem seeks to explore how the principles of PDT can be applied to the design of the High School Check-In System.

PDT is a design theory that seeks to influence user behavior by creating persuasive experiences that motivate users to take action (Oinas-Kukkonen & Harjumaa, 2009). The theory is grounded in the idea that users are motivated by their own goals and desires and that these can be leveraged to create a persuasive experience. PDT has been applied in a variety of contexts, including health, education, and social media, to design systems that encourage positive behavior change (Fogg, 2003; Oinas-Kukkonen & Harjumaa, 2009).

To design a system that is persuasive, designers must consider several factors. First, the system must be designed to be user-friendly and easy to use. Second, the system must be designed to address the user's needs and desires. This can be achieved by understanding the user's goals and designing the system to meet these needs (Fogg, 2003). Third, the system must be designed to be engaging and entertaining. This can be achieved by using game-like elements, such as points, badges, and leaderboards, to motivate users to take action (Deterding et al., 2011).

The High School Check-In System will be designed with the principles of PDT in mind. The welcome screen will include a message that encourages users to start the check-in process. The interface will be designed to be user-friendly and easy to use, with familiar interface elements and clear, concise language.

The interface will be designed to be engaging, using game-like elements such as a progress bar to show how far along the check-in process they are. The interface will be designed to be efficient and easy to use, with a minimal number of steps required to complete the check-in process.

By applying these principles of PDT to the design of the High School Check-In System, the system will be more effective at encouraging users to engage with the process and complete it successfully.

**Emotional Design Theory (EDT):** The Emotional Design Theory (EDT) is a design framework that emphasizes the importance of creating emotional connections between users and products to enhance user experience and satisfaction. In the context of the High School Check-In System, the research problem can be framed as follows:

How can we design an interface that evokes positive emotions and enhances user engagement while facilitating the check-in process for staff, students, and visitors?

To address this problem, we can draw upon relevant design and usability theory beyond Task and Error Analysis. For example, the principles of user-centered design (UCD) can guide the development of an interface that meets the needs and expectations of different user groups (Norman & Draper, 1986). Additionally, the theory of cognitive load can inform the design of an interface that minimizes cognitive effort and maximizes usability (Sweller, 1988).

Moreover, we can apply the principles of emotional design to create a positive emotional response in users during the check-in process (Norman, 2004). For instance, using visually appealing design elements, such as images of smiling faces and bright colors, can evoke positive emotions and increase user engagement (Hassenzahl et al., 2010). Furthermore, providing feedback and clear progress indicators can reduce anxiety and increase user confidence (Lidwell et al., 2010).

By combining these design principles, we can create an interface that is not only functional and usable but also emotionally engaging and satisfying for users. This approach can lead to a better user experience and increase user adoption and satisfaction with the check-in system.

**Accessibility:** Accessibility is an essential consideration in designing digital interfaces, especially for individuals with disabilities or impairments. The High School Check-In System must be designed with the principles of accessibility in mind to cater to individuals with visual, auditory, motor, and cognitive disabilities. Additionally, the interface must be easy to navigate, intuitive, and responsive to reduce errors and user frustration.

The design of the High School Check-In System interface can be informed by various design and usability theories such as user-centered design, human-computer interaction, and usability testing. These theories focus on designing interfaces that are easy to use, efficient, and effective while minimizing user errors and providing feedback to users.

Research studies such as "Design and Evaluation of an Accessible Interface for Mobile E-Commerce" (Shin and Lee, 2021) and "Accessibility of Online Higher Education: A Systematic Review of Design Guidelines" (Alshammary and Abdelhamid, 2020) provide insights on designing accessible interfaces and usability testing for digital interfaces, respectively. These studies can inform the design of the High School Check-In System interface to ensure it meets the accessibility and usability requirements.

Designing an accessible High School Check-In System interface requires a comprehensive understanding of design and usability theories, as well as adherence to design frameworks and guidelines. By implementing these principles, the High School Check-In System can be designed to cater to all users, including those with disabilities, while minimizing errors and providing appropriate feedback.

**Conclusion:**

In conclusion, the problem research for designing a check-in system interface involved exploring appropriate design and usability theory beyond task and error analysis. A well-designed interface should consider user needs, expectations, and cognitive abilities. The literature suggests that interfaces should be intuitive, consistent, and error-tolerant to enhance user experience. Usability testing and feedback are also critical for improving interface design. Applying these design principles and conducting user testing can help create an effective and user-friendly check-in system interface.

1. **Hierarchical Task Analysis diagram or structured task list covering an interaction design for the above functions.**

**Answer:**

**Structured Task List:**

1. School Check-in System
2. Welcome Screen
   1. Display a welcome message and encourage the start of the check-in process
   2. Select your role (Staff, Student, and Visitor)
   3. Allow the user to cancel and return to the welcome screen
3. Staff Check-in
   1. Display list of staff names for selection
   2. Allow the user to confirm selection to complete the check-in process
   3. Allow the user to cancel and return to the welcome screen
4. Student Check-in
   1. Display options for year group (7-11)
   2. Display a list of Form IDs for the selected year group
   3. Display list of student names for selected Form ID
   4. Allow user to confirm selection to complete check-in
   5. Allow the user to cancel and return to the welcome screen
5. Visitor Check-in
   1. Allow user to enter their name
   2. Display list of staff names for selection
   3. Allow users to select staff members they are visiting
   4. Provide an option for the user to take a photo using the built-in camera tool
   5. Display the photo and allow a user to confirm its accuracy
   6. Allow the user to confirm check-in to complete
   7. Allow the user to cancel and return to the welcome screen
6. Cancel
   1. Allow the user to cancel at any point during the check-in process
   2. Return the user to the welcome screen
7. **Error Analysis table detailing predicted error modes and proposed design suggestions relating to the task analysis solutions.**

**Answer:**

**Table 1.Error analysis table**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Tasks** | **Error Modes** | **System Consequence** | **Error Recovery** | **Procedure Implication** | **Design Implication** |
| **1.Welcome Screen** | No welcome message displayed | Users may not know how to start the check-in process | Display a clear welcome message | Display a prominent welcome message | Ensure a clear and prominent welcome message is displayed |
|  | Users unable to select their role | Users may not be able to complete the check-in process | Provide clear options for selecting a role | Display clear and accessible options for selecting a role | Ensure clear and accessible options for role selection |
|  | User unable to cancel and return to the welcome screen | Users may become frustrated and leave the system | Provide an accessible cancel button | Make the cancel button easily accessible | Ensure a clear and accessible cancel button is provided |
| **2.Staff Check-in** | User unable to select their name from the list | Staff members may not be able to complete the check-in process | Ensure a clear and accessible list of names | Display a clear and accessible list of staff names | Ensure a clear and accessible list of staff names is provided |
|  | User unable to confirm selection | Staff members may not be checked-in properly | Provide a clear option to confirm selection | Provide a clear and accessible confirmation button | Ensure a clear and accessible confirmation button is provided |
|  | User unable to cancel and return to the welcome screen | Staff members may become frustrated and leave the system | Provide an accessible cancel button | Make the cancel button easily accessible | Ensure a clear and accessible cancel button is provided |
| **3.Student Check-in** | User unable to select the correct year group | Students may not be able to complete the check-in process | Ensure a clear and accessible list of options | Display a clear and accessible list of year groups | Ensure a clear and accessible list of year groups is provided |
|  | User unable to select the correct form ID | Students may not be able to complete the check-in process | Ensure a clear and accessible list of options | Display a clear and accessible list of form IDs | Ensure a clear and accessible list of form IDs is provided |
|  | User unable to select their name from the list | Students may not be checked-in properly | Ensure a clear and accessible list of names | Display a clear and accessible list of student names | Ensure a clear and accessible list of student names is provided |
|  | User unable to confirm selection | Students may not be checked-in properly | Provide a clear option to confirm selection | Provide a clear and accessible confirmation button | Ensure a clear and accessible confirmation button is provided |
|  | User unable to cancel and return to the welcome screen | Students may become frustrated and leave the system | Provide an accessible cancel button | Make the cancel button easily accessible | Ensure a clear and accessible cancel button is provided |
| **4.Visitor Check-in** | User unable to enter their name | Visitors may not be able to complete the check-in process | Provide a clear and accessible input field | Provide a clear and accessible input field | Ensure a clear and accessible input field is provided |
|  | User unable to select the staff member they are visiting | Visitors may not be checked-in properly | Ensure a clear and accessible list of options | Display a clear and accessible list of staff names | Ensure a clear and accessible list of staff names is provided |
|  | User unable to take a photo | Visitors may not be able to complete the check-in process | Provide clear instructions for taking a photo |  |  |

1. **Diagrams of your prototype screen designs sketches including any features and messages taken from your error table and other design research next to corresponding screenshots of your functional prototype demonstrating the sophistication of your application.**

**Answer:**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **HTA Tasks/Actions** | | | | | |
| **Errors:** From where we start the process | | | | | |
| **Get Started** |  | | | | |
| The welcome screen should have a simple and inviting message, such as "Welcome to Skilled School Check-In System" and with the “Get Started” button. In this design, there are two buttons available which create confusion for the user about which button will start the process. | | | | | |
| **HTA Tasks/Actions 1.2** | | | | | |
| **Errors:** No error | | | | | |
|  | |  | | | |
| Once the process is started this screen should appear and it should have clear options for staff, students, and visitors to choose from. There should be no error messages on this screen. | | | | | |
| **HTA Tasks/Actions 2.1** | | | | | |
| **Errors:** In case of wrong/invalid name is selected | | | | | |
|  | | |  | | |
| This screen should prompt the user to select their name from a list. If their name is not found in the system, there should be an error message asking them to check their name spelling and try again. After selecting their name, the user should be prompted to confirm their check-in. | | | | | |
| **HTA Tasks/Actions 2.2 & 2.3** | | | | | |
| **Errors:** No error | | | | | |
|  | | | |  | |
| After selecting their name, the user should be prompted to confirm their check-in and this pop window will be displayed. | | | | | |
| **HTA Tasks/Actions 3.1, 3.2 & 3.3** | | | | | |
| **Errors:** Wrong selection of group or form id | | | | | |
|  | | | | |  |
| After selecting Students this screen will appear for the selection of year group and form ID from a list. After selecting their year group and form ID, the user should be prompted to select their name from an appropriate list. If their name is not found in the system, there should be an error message asking them to check their name spelling and try again. After selecting data the user should be prompted to confirm their check-in and this task is similar to Task 2.2 & 2.3 which we discussed earlier. | | | | | |
| **HTA Tasks/Actions 4.1, 4.2, 4.3, 4.4 & 4.5** | | | | | |
| **Errors:** Invalid visitor name or wrong selection of staff members | | | | | |
|  | | | | |  |
| This screen should be prompted to ask the user to enter their name and select the staff member they are visiting from a list. If the visitor's name is not found in the system, there should be an error message asking them to check their name spelling and try again. After selecting the staff member, the user should be prompted to take a photo using the built-in camera tool. Before confirming, the user should be shown the photo and given the option to re-take the photo or confirm it. | | | | | |

1. **Diagrams o Evidence of user testing (5 users) with conclusions and a brief summary of subsequent design modifications and recommendations. You should seek out an appropriate cross-section of user types including age and ability etc. and gain their permission. You need to demonstrate that your users were using the prototype built for part 4. Photos and a description of users operating your system is an appropriate ways to demonstrate this. No need for a name, age, gender, etc.**

**Answer:**

**Images for Evidence:**

**Results:**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **User** | **Interaction Time** | **Errors** | **Feedback** | **Recommendations** |
| 1 | 2 mins | 0 | "Easy to navigate" | N/A |
| 2 | 4 mins | 1 | "Confusing layout" | Reorganize layout |
| 3 | 3 mins | 0 | "Clear instructions" | N/A |
| 4 | 5 mins | 2 | "No Search bar to Search any information" | Add a search bar to your design |
| 5 | 6 mins | 3 | "Unclear labeling" | Improve labeling |
| 6 | 2 mins | 0 | "Intuitive design" | N/A |
| 7 | 7 mins | 4 | "Not enough visual cues" | Add more visual cues |
| 8 | 3 mins | 1 | “Good” | Check the top right “Get Started” button |
| 9 | 8 mins | 5 | "No error message is shown" | Add a proper message on the user leaving any text field empty etc. |
| 10 | 4 mins | 1 | "Good overall experience" | N/A |

**Conclusions:**

* Users generally found the design to be easy to navigate and the instructions clear
* Some users had difficulty finding information, were confused by the layout, or had trouble with the search information
* Labeling and visual cues could be improved to make the design more intuitive

**Summary of Design Modifications and Recommendations:**

* Reorganize the layout to reduce confusion
* Add a search bar to find the information more easier
* Improve labeling to make it clearer
* Check the proper working of buttons
* Add more visual cues to guide users
* Add a proper message on the user leaving any text field empty etc.

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