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UX – Assignment 2

Multimodal system:

The multimodal system I've developed to address student focus challenges is FocusFlow, an application that synchronises with lecture content in real-time. This tool follows the lecturer's presentation while providing enriching explanations when needed. The visual interface features a split-screen layout where students can tap, swipe, or highlight elements for more information. Students choose how they interact with these features, maintaining control of their learning experience through touch gestures and text input. FocusFlow helps students stay engaged throughout lectures while building deeper understanding of complex topics. It bridges passive listening and active learning without distracting from the lecturer's teaching. After lectures, students can upload notes for analysis, receiving suggestions that enhance the quality and accuracy of their study materials without needing to reread lecture slides.

Analysis of the speculative design of an interactive system:

FocusFlows design embodies Norman's principles to create an intuitive system that enhances student focus during lectures. The application provides a clear conceptual model where lecture content flows alongside AI-enhanced explanations, creating a mental model that students easily understand. As Norman (2013) emphasises in "The Design of Everyday Things," good conceptual models allow users to predict the effects of their actions. This is evident in how the interface visibly represents the relationship through a split screen approach where lecture slides appear alongside interactive assistance options. The ethnography study revealed students struggle to maintain attention when unable to visualise connections between concepts, which this design directly addresses.

The system provides immediate feedback when students interact with content, with visual cues confirming when explanations are loading and when note analysis is complete. Norman argues that effective feedback must be immediate and informative but not distracting a balance achieved through subtle animations and progress indicators that keep students informed without pulling focus from the lecture. The interface naturally maps to the lecture experience, with content progressing chronologically from top to bottom, matching how information unfolds during class. Similarly, the note analysis screen presents improvements directly alongside original content, creating a natural mapping between problems and solutions, a principle which Norman identifies as crucial for intuitive use.

FocusFlow incorporates clear affordances through buttons that visually indicate their functions such as the "Get Insights" button that appears when hovering over complex concepts. The affordances align with findings from the ethnography that students often hesitate to seek clarification during lectures. The system constrains inappropriate actions by dimming certain features during critical lecture moments, preventing students from becoming distracted when key information is being presented directly addressing the attention drop identified in our research. Consistency is maintained throughout the interface, with similar functions using identical icons and colour schemes across different sections. The note upload feature exemplifies this consistency, using familiar upload controls that match the interaction patterns established throughout the rest of the application.

By implementing Norman's principles, grounded firmly in his cognitive design framework, FocusFlows creates a cohesive system that distributes cognitive load effectively, allowing students to maintain focus on lectures while seamlessly accessing the enhanced understanding they need to succeed.

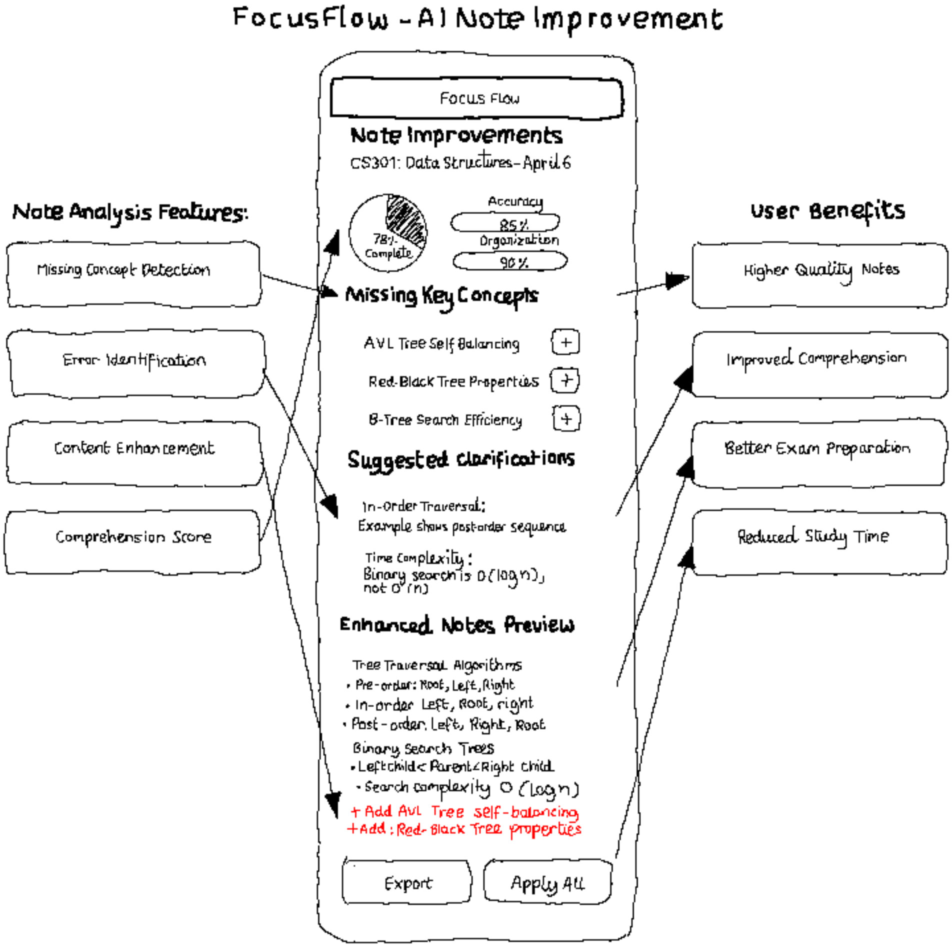

Figure 1 – Mock design of FocusFlow Note improvement UI

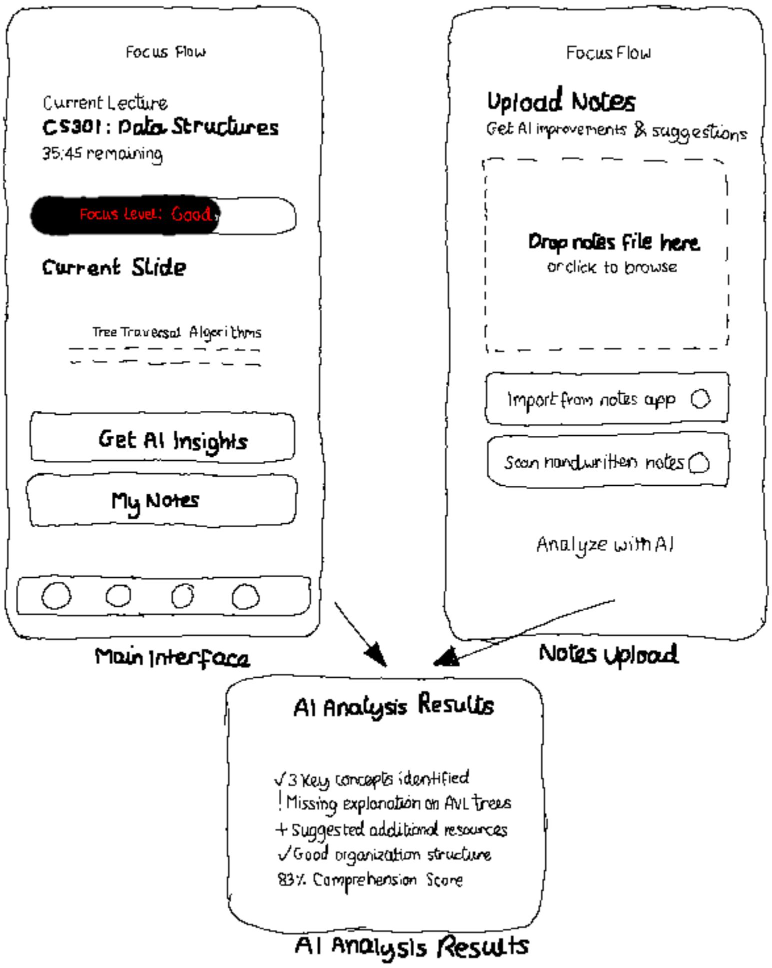

Figure 2 – Mock design of FocusFlow App UI

A DC analysis of the system:

The distributed cognition framework offers a valuable lens to analyse how FocusFlow supports students during lectures. This approach examines how thinking and understanding are distributed across people, tools, and environments rather than confined to individual minds. The system fundamentally reshapes how cognitive load is shared between students, technology, and educators in the learning environment. This analysis explores how the system distributes mental workload, represents information, functions within the lecture environment, and addresses the core challenge of maintaining student focus.

FunctionFlow distributes cognitive responsibilities in ways that significantly reduce student mental workload. During traditional lectures, students must simultaneously listen to the lecturer, understand complex concepts, decide what's important, and take comprehensive notes. This cognitive juggling often leads to the attention drop, particularly in the final 30 minutes of lectures as found in the ethnographic study.

The app takes on several cognitive tasks that would otherwise burden students. It maintains a synchronised representation of lecture content, freeing students from worrying about missing information. When students encounter difficult concepts, they can delegate the task of finding additional explanations to the AI component rather than trying to recall previous knowledge or guess at meanings. This offloading allows students to direct more mental resources toward understanding the lecturer's explanation. The lecturer continues to provide the primary content and structure, but the system creates a cognitive partnership where the app becomes an extension of both the lecturer's teaching and the student's learning process. For example, when a student requests clarification on a specific slide topic, the app doesn't replace the lecturer but extends their explanation through supplementary information tailored to that student's needs.

The AI functions as another cognitive agent in this distributed system, processing lecture content, analysing student notes, and generating explanations. Its role is particularly important when human attention naturally fluctuates. When attention dips, the AI can temporarily take on a greater share of the cognitive load by providing summaries or highlighting key points.

The representation of information in FocusFlow is central to its effectiveness. The app transforms lecture content from ephemeral spoken word and temporary visuals into persistent, interactive resources. This transformation allows students to engage with material at their own pace and revisit complex points without relying solely on memory. Student notes undergo significant representational change through the note analysis feature. Original notes, often incomplete or containing misconceptions, are transformed into enhanced versions with highlighted corrections, additional context, and structural improvements. This transformation process makes the quality gap in notes visible and addressable rather than hidden and persistent. Visual representations in the interface serve as external memory aids. The focus meter provides a visual cue about attention levels, making concentration externally visible and trackable. Similarly, progress indicators for lecture timing create an external representation of time passing, helping students manage their attention resources appropriately. These representations reduce cognitive load by externalising information that would otherwise require mental tracking. Rather than remembering which concepts they didn't fully grasp, students can see them visually marked in their enhanced notes, transforming an internal memory task into an external visual cue.

FocusFlows effectiveness depends on how well it integrates into the physical and social context of lectures. The design acknowledges that lectures happen in shared physical spaces with specific social expectations. The app allows for discreet interaction through personal devices, ensuring that students can seek additional help without disrupting the lecture flow.

The timing of information presentation aligns with natural attention cycles. The system can provide more supportive features during the later portions of lectures when our ethnography showed attention typically wanes. This makes the system responsive to the changing cognitive needs throughout a lecture session. Physically, the app accommodates the reality that students primarily focus on the lecturer while occasionally referencing their devices. Interface elements are designed for quick comprehension with minimal visual search, acknowledging the divided visual attention inherent in the lecture environment.

FocusFlow is particularly well suited for lecture environments because it addresses the specific cognitive challenges identified in the ethnography. The system recognises that lectures typically involve one directional information flow with limited opportunities for clarification. By providing an unobtrusive channel for supplementary information, it addresses this fundamental limitation. Different subjects present varying cognitive demands, and FocusFlow accommodates this by allowing students to choose when and how to engage with features. Technical subjects might see more requests for concept explanations, while discussion based courses might benefit more from the summarisation features.

This distributed cognition analysis reveals how FocusFlow effectively redistributes cognitive load across the learning ecosystem. By offloading specific mental tasks to technology, the system allows students to maintain focus on understanding rather than just capturing information. The transformation of lecture content and student notes into enhanced, persistent representations fundamentally changes how information is processed and retained.

References:

Norman, D.A. (2013) The Design of Everyday Things: Revised and Expanded Edition. New York: Basic Books.

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https://hci.ucsd.edu/hollan/Pubs/tochi-revised.pdf

Note: All sketch images (Figure 1 and Figure 2) created by Author of paper Ambia Hussain.