PARTNERING WITH THE INTELLIGENCE COMMUNITY TO ENHANCE AI INTERFACE DESIGN EDUCATION

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ABSTRACT
Artificial intelligence (AI) is increasingly expanding its capabilities and presence in fields because today's industry demands working with big data (BD) to extract meaningful user insights to align its goal with success. The government sector, specifically the intelligence community (IC), is no exception to this need. The study partnered with the IC sponsors and set up a conceptual enterprise dashboard project to explore novel AI features to search, triage, and contextualize BD and to address the educational challenges in preparing students to work in the changing technological industry when designing a new product. The study focused on improving the students' academic experience in navigating the ambiguity built into the explorative aspects of AI projects. During each phase of the Design Thinking (DT) process, eleven students, in groups of three, discussed the difficulties of finding design solutions because of the user data gaps in the brief due to the confidentiality required in the IC and the challenge of the innovation in building novel interactive features. The study utilized the DT and Design Inquiry of Learning (DIL) framework to identify the design process's understanding, defining, ideating, and validating phase to benefit from including role-playing and storytelling activities for students experiencing frustrations due to the ambiguity built into the project.

Keywords: UX design education, generative AI, ambiguity in design, role-playing, storytelling

1 INTRODUCTION
The disruptive nature of Artificial Intelligence (AI) technology is “Reshaping the global ecosystem,” which also “Significantly impacts the financial market” [2]. Researchers in other fields, like medical biology, are also trying to utilize AI to analyse data [9]. Reviewing an accurate depiction of quantitative data or attaining qualitative insights offers better choices for organizations when making important decisions. The public sector also needs to process big data (BD) to “Recognize decision-making process opportunities” and implement AI to aid human agents in the workflow [4]. To improve the quality of undergraduate senior students' User Experience (UX) design learning opportunities, the study partnered with the Laboratory for Analytic Sciences (LAS) and the National Security Agency (NSA) of the United States to collaborate on an AI-driven conceptual Enterprise Cognitive Computing (ECC) tool while addressing the industry needs to find more designers capable of discovering novel interactions between a human agent analysing BD using AI. Because AI technology can maximize its impact on increasing the value of enterprise businesses by implementing ECC in data [8], the project scope involved student designers reimagining the ECC tool as a data dashboard. Utilizing the Design Inquiry of Learning (DIL) framework, the study plans to evaluate educational challenges and identify pedagogical approaches for the studio project in a higher learning environment [6]. In addition to DIL, the sponsored project utilizes the Design Thinking (DT) process, which shares similar methods like “Need-finding, brainstorming, and prototyping within multidisciplinary teams” [1, 7]. The challenge of the project involves students learning to design an ECC product by finding the relevancy among data, analysing tasks with built-in AI features, and identifying the areas to improve in the conventional process for three personas provided by the sponsors. While DT offers a structured framework for an educator to facilitate a speculative ECC product design process for UX and UI senior undergraduate design students in a studio setting, the need for creative flexibility becomes a crucial component of the learning experience when faced with navigating through an ambiguous territory in innovation that can result in frustration. The sentiment echoed in DT practitioners who see the “Step-by-step process” hinders “Fluency in thinking and

flexibility in approach, which is essential in Design-driven innovation" [1]. Therefore, the study utilizes the DIL to highlight areas of the educational challenge in the DT design cycle for students speculating a novel design solution for the IC. Observation, discussion, and documentation of the student's work progress in each of the DT design cycles establish valuable insight to answer the research question: How can a role-playing mindset and storytelling ability help address ambiguity in a speculative AI project for undergraduate students to improve the learning experience when designing a dashboard for data analysts from the intelligence community?

2 METHOD

Partnering with Intelligence Communities (IC) like LAS and NSA added the educational benefit of increasing ambiguity associated with innovation so that students could learn how to derive and develop an AI dashboard solution with data analytic features by utilizing the DT as a framework (Table 1).

Table 1. Project Scope

	Understand Users	Define Problems	Ideas/ Prototype	Feedback	Implement/ Delivery
Timeline	1 weeks	2 weeks	3 weeks	1 weeks	2 weeks
Number of Senior Undergraduate Students	11	11	11	11	11
UX Design Methods	Requirements	User Persona	Flow Charts	Internal Testing	High-Fi Wireframe
	Value proposition	User Story	Low-Fi Wireframe	Usability Testing Link	Figma Files
	Market Research	Journey Map	UI Components		UX Documentation
	Questionnaires		Prototype		
Tools	Google Workspace/ FigJam/Figma/ Interactive Game	FigJam	Pen/Paper/ Whiteboard/ Post-it note/Figma	Google Workspace/ Figma/ Zoom	Figma
Facilitators	A faculty member, graduate assistant, and technical program manager from the sponsor.	A faculty and graduate Assistant	One faculty, graduate assistant, and guest workshop facilitator	A faculty and graduate Assistant	A faculty and graduate Assistant
Sponsors	LAS & NSA	LAS & NSA	LAS & NSA	LAS & NSA	LAS & NSA

Because the sponsoring IC is part of the public sector that needs analysing BD to extract meaningful insights, incorporating AI technology encouraged students to explore novel approaches in improving the dashboard's graphical user interface (GUI) concerning search, triage, and contextualization of data. The unique challenge of collaborating with the IC community on the given topic was for the students to reimagine the interface without fully understanding the sponsors' current technology, data, and user information due to the confidentiality tied to the industry. The proxy data from the sponsor represented a BD for the dashboard and user data. DT offered a design framework for the students, and DIL enabled

the study to discuss the educational challenges of the specific phase within the DT design cycle. Using the structured steps in the DIL and DT as a framework for conducting the UX design methods helped to locate areas of improvement in learning (Figure 1).

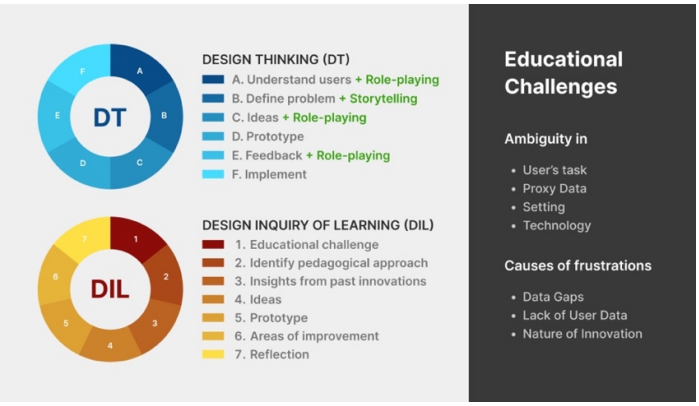

Figure 1. Design Thinking (DT) and Design Inquiry of Learning (DIL)

The study collected research data through semi-structured questions, participant observations, and documentation of the entire design process; the limited access to the contextual user data regarding the working environment, the current tools, and the workflow was the culprit that caused the students to experience uncertainty and anxiety about committing and validating a design direction. (Table 2). The semi-structured questions were chosen because of their flexibility and strength in exploring the topic versus the structured format, which provides more validity but hinders in-depth discussions.

Table 2. Data Collection Methods

	Group Discussions	Participant Observation	Documentation of the Design Output
Number of Student Participants	11	11	11
Duration of Each Session	30 Minutes	4 Hours	4 Hours
Number of Sessions	3	18	18
Settings & Location	In-person lab	In-person lab	In-person lab
Data Type	Text	Text	Digital File
Data Storage	Figma	Figma	Figma, FigJam, and Google Drive

Learning about students' roadblocks in the understanding, defining, ideating, and feedback phases from the DT process as areas causing the most frustration, the facilitator implemented role-playing and storytelling as a pedagogical approach to mitigate the students' pain points in conceptualizing the speculative AI dashboard. Because of the effectiveness of learning the subject materials through acting out assumptions and improvisations in role-playing, the educational method became the tool for understanding users with limited access to their behavioural information [5]. Storytelling was another method that enhanced the empathetic outlook of the user and context, resulting in design discoveries [3]. The two educational methods are designed to improve the learning and design outcomes for the students in the following areas of the project.

- Role-playing mindset to understand users: Provided a proxy background story and game concerning user data for better empathizing with a user group.
- Storytelling to fill the data gap: Involved the cohort using storytelling ability to synthesize user scenarios from proxy data and attained confirmation through the questionnaire results.
- Role-playing mindset and storytelling to innovate: Conducted a supplementary flowchart

workshop and internal usability testing session to help ideate and refine the design direction.

2.1 Role-playing Mindset to Understand Users

Since the sponsors were not allowed to share data that might breach a security measure guided by the agency, the project began with brief representative information about the problem space and users with an interactive game to help explain types of daily tasks. The brief included artificial objectives, labels, and backgrounds regarding the place and people. The crime investigative game shared by the sponsors provided a flow of analytical tasks without displaying the technology utilized by the people at the agency, which assisted three groups of three to four students with a role-playing mindset to develop an understanding of the types of analysis. The three separate student group settings allowed the project to address the target audience's different experience levels and daily tasks in finding contextual insights by searching through potential relevancy among random raw data sets. Proxy maps and the artificial names of the organizations with personas helped the group with a mental model of the roles of users within a context regarding their environments and objectives.

2.2 Storytelling to Fill the Data Gap

The proxy dataset provided by the sponsors included a map of an artificial country and regions. The challenge for the students involved creating relevancy among the data types such as date, time, data permission, mobile number, device data, battery charge level, battery drain level, connection type, name, user ID, regional area code, cellular location area code (LAC), cellular tower ID, signal power level, Wi-Fi network service set identifier (SSID), Wi-Fi speed, review submission time, rating, text, picture URL, responses from business and App business ID. Each group with an assigned persona had to find relevancy between data types to address the persona's objective; as mentioned in the following research questions, the facilitator converted from the sponsor project brief to guide the students.

- Persona 1 Team Leader "Christian" - How can a digitally assisted search feature help collect and prioritize global information for the IC data analyst team leader to create a contextualized report to inform a domestic policymaker?
- Persona 2 The Devotee "Maria" - How can a search result widget leverage optical UI components for the IC data analytic consultant to identify and present new relevant sources of information?
- Persona 3 The Beginner "Evan" - How can a digital assistant and human-aided filter components help eliminate the learning curve for the beginner-level IC data analyst in becoming an expert at sorting through auto-generated irrelevant data in a relatively short time?

For example, the facilitator guided each group of students to build a situational story from the given proxy data to help explain the objective and action needed for each persona because the cohort struggled to find relevancy between different data types. The facilitator directed a group to devise a story that involved a given proxy map surrounded by the ocean. By incorporating the situational context, like hurricane season, the group was able to construct a scenario for locating a vulnerability in the region's telecom network to help address the objective of the persona, creating a report for a policy change. The inclusion of the story aided in creating a mental map for the student group to develop a user flow of an AI-driven dashboard that can generate contextualized reports for the persona, "Christian," who informs the domestic policymakers (Figure 2).

2.3 Role-playing Mindset to Innovate

2.3.1 Workshop

Flowchart within the ideate phase from DT required the students to imagine an optimal workflow for the personas. To enhance the learning outcome, a guest facilitator from the E-commerce industry conducted a virtual workshop concerning a novel solution for designing a flowchart for personas in the medical field.

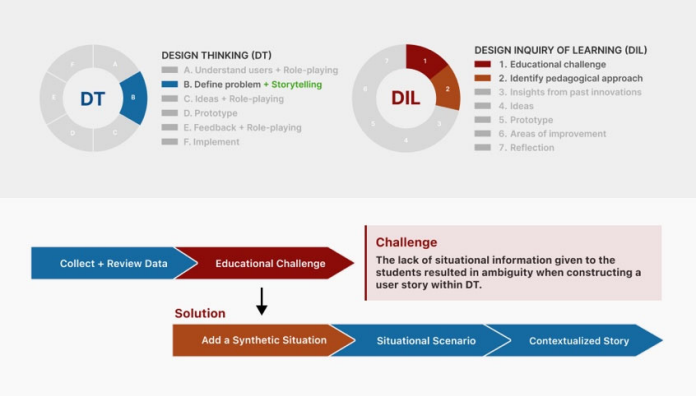

Figure 2. Storytelling in the DT's Define Phase

The prompt from the workshop facilitator reflected the complexity often presented in e-commerce and health sectors' ideating workflows that require data-driven products like the sponsored project from the IC. In collaboration with the guest workshop facilitator, the study deliberately created ambiguity in the workshop activity to foster innovation and to engage the cohort in developing their ability to recognize opportunities for new approaches through a role-playing mindset. The students communicated the benefit of participating in the workshop, which involved the cohort acting as an artificial design team to solve problems for employees and customers using an enterprise digital product. The session lessened the frustrations expressed by the students, especially when they realized the parallel between the workshop and the funded project that required the role-playing mindset to be comfortable with the presence of ambiguity in the design process.

2.3.2 Internal Usability Testing of the Dashboard Solution

The study conducted external and internal usability testing after completing a prototype draft in Figma with preview links that can be accessed through any web browser. The prototype link with a few questions was sent to the sponsors for the data analysts' virtual feedback due to the security and logistical restrictions of being unable to conduct the session in person. While waiting on the user feedback, the study asked each student group to access the other team's workflow, acting out as their assigned persona. Each team member had not seen the progress of different groups' dashboard solutions since the rough wireframe stage to mitigate bias. The student testers entered the lap one at a time to prohibit each student from sharing the results of individual walkthroughs. They were screen-recorded using a facilitator's laptop to locate areas of improvement. Compared to the feature-driven sponsor comments, the role-playing students provided insightful navigational feedback, allowing each group to revisit their design solution with a clear direction. (Figure 3).

Figure 3. Role-Playing in the DT's Feedback Phase

3 CONCLUSIONS

During the nine-week studio sessions, the study recognizes designing a novel AI feature in a data dashboard for IC requires a UX UI design practitioner to navigate through ambiguity, especially in the

understanding, defining, ideating, and validating phases of the DT. The undergraduate students struggled when constructing user stories and flow charts from the proxy data the sponsor provided without much detail on a user's environmental, technological, or behavioural context in utilizing the current dashboard. This allowed the study to identify pedagogical opportunities to incorporate storytelling and role-playing activities to reduce learning challenges. The storytelling mindset encouraged the students to construct a situational scenario to find relevance among proxy data and establish the design direction. Role-playing as a user group when conducting internal usability testing improved learning about the method while receiving valuable feedback from peers. The students expressed that the internal usability testing was more useful than the written feedback from the sponsors because they could see their peers' behavioural responses when struggling to navigate a specific part of the prototype. The sponsor user group could not attend the usability testing in person due to the restriction in revealing their identity to the public. Activities like interactive gaming and flowchart workshops also mitigated the students' frustrations of not knowing the current state of user needs concerning the technology in place and their workflow, especially in the early stage of the project cycle. With a few student participants, this qualitative study gained much of its in-depth insights to answer educational challenges within a specific DT cycle and deliver a speculative AI dashboard design outcome to the IC sponsor during the final presentation.

Therefore, the study advocates a learning environment that includes role-playing and storytelling activities in the DT process for developing new technological digital product features when partnering with sponsors to work with sensitive data. Furthermore, exploring different role-playing and storytelling pedagogical methods to increase contextualized understanding about the user without jeopardizing the exposure of restricted information will advance the learning experience for undergraduate UX design students, taking on the challenge of solving ambiguous problems in designing a new AI product features for any industry sectors working with protected data.

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