Structuring Collaborative Reflection: Integrating Diary Study and Focus Group Discussion

Jixiang Fan
Department of Computer Science
Virginia Tech
Blacksburg, VA, USA
jfan12@vt.edu

Jiacheng Zhao
Department of Computer Science
Virginia Tech
Blacksburg, VA, USA
techzjc@vt.edu

Sunggyeol Oh
Department of Computer Science
Virginia Tech
Blacksburg, VA, USA
sunggyeol@vt.edu

Michael Bolmer Jr
Department of Computer Science
Virginia Tech
Blacksburg, VA, USA
mbolmer@vt.edu

Yoonje Lee
Department of Computer Science
Virginia Tech
Blacksburg, VA, USA
ylee201@vt.edu

Nick Flammer
Department of Computer Science
Virginia Tech
Blacksburg, VA, USA
nickf55@vt.edu

Yuhao Chen
Department of Computer Science
Georgia Institute of Technology
Atlanta, GA, USA
ychen677@gatech.edu

D. Scott McCrickard
Department of Computer Science
Virginia Tech
Blacksburg, Virginia, USA
mccricks@cs.vt.edu

Abstract

We present a structured reflection framework integrating diary study and focus group discussion to support collaborative meaning-making in HCI education. The framework follows a multi-phase design in which students progress from individual journaling to a two-stage group discussion sequence: first within shared application contexts, then across emergent experiential themes. To support this process, we extended DiaryQuest, a lightweight educational tool incorporating AI-assisted grouping, image-based prompts, and a Jigsaw-inspired workflow to scaffold participation. A preliminary classroom deployment with 11 undergraduate students suggests that the approach lowers the barrier to reflective dialogue, encourages cross-perspective engagement, and helps students surface design-relevant insights grounded in lived experience. These findings point to new opportunities for structuring reflection in sociotechnical learning environments.

CCS Concepts

• **Human-centered computing** → **Human computer interaction (HCI)**; • **Applied computing** → **Collaborative learning**.

Keywords

Diary Study, Focus Group Discussion, Jigsaw Learning

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1 Introduction

In recent years, diary studies have gained traction as an educational tool in Human-Computer Interaction (HCI) courses [4, 11], offering students a structured approach to critically engage with real-world technology use through extended, situated, and potentially collaborative reflection. Unlike traditional user research assignments, diary studies allow learners to experience technologies over time, helping them develop more profound insights into interaction patterns and user needs [6, 22]. A recently introduced four-phase educational framework [10], consisting of **Plan, Collect, Analyze, and Reflect**, has been proposed to scaffold the diary study process in classroom settings. This structure allows flexibility in implementing the reflection phase, including peer discussion, guided prompts, or sociotechnical tools that support collaborative meaning-making.

While the reflection phase is critical for helping students synthesize insights from diary-based observations, relying solely on individual written reflection often limits the depth and diversity of ideas. In educational contexts, students may struggle to make sense of their experiences in isolation, particularly when exploring complex or unfamiliar user interactions [21]. Focus group discussions (FGDs) offer an established pedagogical strategy to address this challenge by enabling students to articulate their thinking, hear alternative perspectives, and build shared understanding through structured conversation [1]. Widely used in qualitative research and increasingly adopted in classroom settings, FGDs support knowledge construction through peer interaction and social comparison. These are especially valuable in courses like HCI that emphasize interpretation, empathy, and iterative design [7]. Incorporating FGDs into the reflection phase of a diary study thus helps students

move beyond personal interpretation and engage in collaborative meaning-making.

We designed a focused activity integrating structured prompts with FGD to address the underexplored reflection phase in diary-based learning. Informed by the final stage of a four-phase educational framework [10], this activity allows students to revisit their diary entries, explore shared themes, and collaboratively reflect on their experiences. A vision-language model (VLM) [5] is used to identify thematic similarities across diary entries and assist in forming peer groups, enabling students to compare and contrast usage patterns from diverse perspectives. The rationale for integrated VLMs is to provide thematic insights and reduce instructor workload by automating the identification of cross-student patterns in diary entries. The discussion process draws inspiration from Jigsaw cooperative learning [3], in which students first reflect in groups that share a common app experience, then reorganize into expert groups based on shared reflection themes. This two-stage structure enables contextual grounding and exposure to alternative perspectives, encouraging students to construct a more nuanced understanding of user experience across different technologies. We implemented this process within *DiaryQuest* [20, 25], an educational tool that offers simple visual analytics and supports theme-based grouping and image-based reflection prompts to scaffold collaborative reflection.

2 Background

In this section, we outline the key pedagogical and methodological foundations that inform our approach to structured reflection in diary-based learning.

2.1 Four-Phase Diary Study Framework

Diary studies have long been used in HCI research to capture longitudinal, in-situ experiences with technology [9, 14, 24]. More recently, educators have begun adapting diary methods for classroom use, particularly in courses focused on user-centered design [12]. To guide this adaptation, a structured four-phase framework has been proposed to support diary studies in educational settings: Plan, Collect, Analyze, and Reflect [10]. Each phase targets specific pedagogical needs: the Plan phase defines goals and technologies for study, Collect structures how students gather their experiences, Analyze introduces methods to interpret diary data, and Reflect encourages students to consolidate their learning and interpret design implications. This framework has been applied in introductory HCI courses to help students experience technology as users and evaluators of user experience. Students develop a richer understanding of how interfaces work in real-world contexts through structured prompts and repeated exposure. While the Plan, Collect, and Analyze phases are often tightly scaffolded by instructors, the Reflect phase tends to be more open-ended and varies significantly across implementations. Students are sometimes asked to submit written summaries or complete individual reports, which may lack the dialogic depth and perspective-sharing needed for collaborative interpretation. The flexibility built into the Reflect phase is intentional, allowing instructors to adapt reflection activities based on class size, course goals, and student background. However, this also creates an opportunity and a challenge to design reflection experiences that move beyond individual synthesis. Our work addresses this challenge by embedding collaborative structures into the reflection phase, combining FGD with theme-based peer groupings to support richer meaning-making.

2.2 Focus Group Discussion in Reflective Learning

FGD is a widely used method in qualitative research and education to surface diverse perspectives, build shared understanding, and support collaborative interpretation of experiences [2, 15]. Rooted in social constructivist theory, FGD emphasizes learning as a dialogic process, where meaning is co-constructed through discussion, comparison, and negotiation among participants. In reflective learning contexts, such as HCI education, FGDs can help students articulate their ideas more clearly, challenge assumptions, and recognize patterns in their own and others' experiences [1, 7]. Compared to solitary reflection methods such as journaling or written reports, FGDs provide a dialogic space that can deepen understanding by surfacing alternative viewpoints. Prior work has shown that structured group discussions can enhance students' ability to interpret complex user experiences, increase empathy toward others' perspectives, and generate richer insights during design or evaluation tasks [8, 16, 19]. The format is handy in contexts emphasizing interpretation, personal relevance, or emotional response, where peer dialogue helps students situate their reflections within a broader social or technological context. While FGDs offer pedagogical value, their use in classroom settings can be constrained by time, group dynamics, and logistical coordination [13]. These challenges have prompted interest in semi-structured formats and digital or AI-supported tools that can guide and scale reflective discussion processes.

2.3 Jigsaw Learning as a Structure for Collaboration

Jigsaw learning is a cooperative learning strategy developed by Aronson and colleagues to promote interdependence and equal participation among students [3]. It has since been widely adopted in educational settings, emphasizing peer learning, collaboration, and distributed knowledge construction [18, 23]. At its core, Jigsaw learning involves a two-stage group structure: students work in "home groups" to study distinct parts of a topic, then reassemble into "expert groups" where each member contributes their specialized knowledge. Through this structure, students learn from their exploration, teaching, and learning with peers. This approach has demonstrated benefits across various educational contexts, including improved engagement, more profound comprehension, and stronger student social cohesion. Notably, the Jigsaw method promotes perspective-taking by exposing students to content beyond their initial scope. It also provides a clear collaborative structure that can be adapted to different content domains. In reflection-centered activities, Jigsaw-style grouping offers a way to combine shared experience with thematic diversity. For example, learners might begin by discussing a topic within a contextually grounded group, then reorganize into groups formed around emergent themes or conceptual similarities. Such designs maintain personal relevance while

encouraging broader interpretive connections, making the Jigsaw model a flexible structure for organizing collaborative learning and reflection.

3 Structuring Reflection Through Diary Study and FGD

Prior work has highlighted the pedagogical value of FGD in supporting reflection, but it remains unclear how such discussions can be systematically integrated into existing diary study workflows. This section presents a structured reflection process to enhance the Reflect phase of a four-stage diary study framework. This process balances individual and collaborative modes of reflection and is designed to scaffold student engagement with personal experience and shared themes across a class cohort.

Our reflection structure is organized into three sequential phases, each pedagogically aligned with core learning goals in HCI education: experience contextualization, collaborative interpretation, and reflective synthesis.

3.1 Individual Reflection and Thematic Extraction

Students begin by engaging in diary writing over a multi-week period, during which they document their daily interactions with assigned technologies. Entries are prompted to elicit reflections on in-situ use contexts, emotional and social responses, usability challenges, and unexpected outcomes. This longitudinal and situated data collection helps students move beyond abstract reasoning and instead attend to the nuances of real-world technology use. Once the entries are submitted, the instructional team conducts a thematic scan of the collected reflections. This can be done manually or supported by computational techniques such as keyword extraction, topic modeling, or VLMs that analyze multimodal entries (e.g., images and text). These techniques help surface salient themes that recur across participants, such as motivation, distraction, emotional fatigue, or social comparison, which then serve as anchors for group discussion in later phases. By the end of this stage, students have developed a corpus of rich, grounded reflections that represent individual perspectives and class-level thematic signals. These outputs form the basis for organizing students into discussion groups and structuring prompts in the next stage.

3.2 Two-Stage Group Discussion

The collaborative discussion phase follows a Jigsaw-inspired, two-stage structure to scaffold contextual grounding and cross-perspective interpretation. Students first participate in discussions within ***App Groups***, where all members use the same assigned technology during the diary phase. These groups provide a shared frame of reference, enabling participants to exchange observations anchored in common usage contexts. This phase fosters comfort, specificity, and validation, allowing students to articulate what felt intuitive or frustrating and to surface overlooked patterns through peer reinforcement. After initial discussion within App Groups, students are reorganized into ***Theme Groups***, which cut across application boundaries. Grouping is based on recurring themes identified during the thematic scan in the previous stage, such as emotional motivation, social distraction, or goal-setting struggles. Each Theme Group brings together students who experienced similar cognitive or affective dynamics, even if those arose from different technologies. This second stage supports higher-order interpretation by encouraging students to explore how a common theme manifests differently across use cases, user goals, or technological affordances. Throughout both discussion rounds, students receive structured prompts from their diary entries and class-level themes. These prompts guide reflection while leaving room for student-driven dialogue. The two-stage process aims to help students move from context-specific articulation to abstract, comparative reasoning, thereby developing design-relevant insight that transcends their own usage experience.

3.3 Reflection Consolidation and Recontextualization

Following the FGD, students individually synthesize insights from their diary entries and peer discussion. This final step encourages them to revisit initial assumptions, highlight key takeaways, and articulate design-relevant conclusions. Depending on course goals, the synthesis may be a written reflection, a concept map, or a brief design critique. Instructors may support this process through prompts that encourage comparison, recognizing divergent perspectives, and identifying blind spots. The goal is to help students recontextualize personal experience through collaborative interpretation and translate it into actionable insight.

This three-phase structure was intentionally designed to address several known challenges in reflective practice: the isolation of individual reflection, the unstructured nature of many classroom discussions, and the difficulty translating experience into design insight. By embedding FGD into a staged and theme-driven workflow, the process enables deeper engagement, peer learning, and scalable deployment in large educational settings. The following section describes how we implemented and supported this workflow using a lightweight educational tool.

4 System Design: DiaryQuest as a Reflection Facilitator

To support the structured reflection framework described in Section 3, we extended ***DiaryQuest***, an educational tool built initially for diary-based coursework. Our enhancements introduced new modules to scaffold small-group interaction, enable theme-based grouping, and integrate lightweight AI for reflection organization. The design goal was not only to structure collaboration, but to do so in a socially intuitive way, pedagogically grounded, and logistically scalable in large class settings.

In the individual reflection phase, students submit diary entries over time, accompanied by representative images that capture key moments or emotions from their experience. The system provides simple visualizations, such as word clouds and timeline-based emotion plots, to help students identify patterns in their reflections. VLMs analyze text and images, surfacing latent themes across the class. This analysis informs later group formation and thematic anchoring, reducing the instructor's manual effort and providing a shared vocabulary for students.

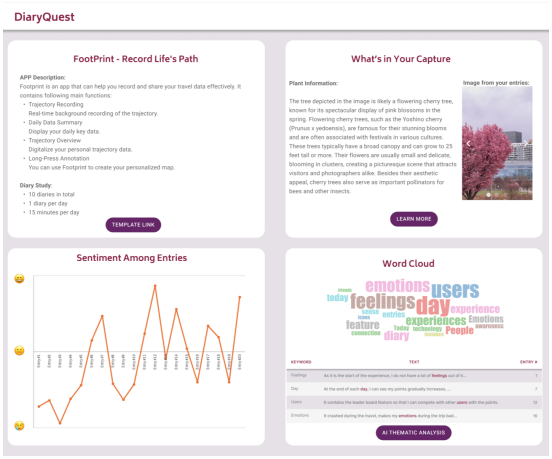

Figure 1: DiaryQuest System

During the two-stage discussion phase, the system facilitates a Jigsaw-inspired transition from shared-context groups to theme-based groups. In the App Group phase, students are grouped with peers who used the same technology. The system prompts participants to select and share a representative image they uploaded and a short caption describing its emotional or experiential relevance. DiaryQuest then structures the discussion using predefined sentence starters and scaffolded input fields. Group members are encouraged to respond by selecting from a set of interaction types, such as expressing personal resonance (e.g., "I felt the same way when…"), offering alternative interpretations (e.g., "I saw this differently because…"), or posing clarifying questions. This interaction model is designed to lower participation barriers, especially for students less confident in verbal articulation, while anchoring the conversation in concrete, visual artifacts. The system facilitates emotionally grounded peer dialogue by embedding these social response templates into the interface and helps students identify shared patterns within everyday usage. In the Theme Group phase, students are regrouped based on latent themes identified through VLM analysis of their multimodal diary submissions. DiaryQuest automatically assembles each theme group's shared materials into a collage of representative images and a word cloud derived from prior inputs. These visual artifacts serve as anchors for discussion, enabling students to explore how similar emotional or experiential patterns are manifested across different technologies. The system provides sentence-level prompts to guide interpretation, such as "What story do you see in this collage?" or "Which image captures your experience most closely, and why?". Each student contributes short textual responses to a shared input space, and the system surfaces these for collective review. This structure encourages students to notice subtle contrasts in how a theme, such as motivation or distraction, appears across diverse contexts. The aim is not only to compare experiences but also to support reflection that moves from context-specific recall to theme-level abstraction.

In the final synthesis phase, students return to their original App Groups and engage in a guided consolidation activity that builds on insights from the Theme Group discussion. DiaryQuest presents a structured response interface with scaffolded prompts such as "What changed in your perspective after hearing from others?" and "How might this theme inform future design considerations for your app?". The system resurfaces key artifacts from earlier stages, including images, captions, and peer inputs, to support this process. This phase also marks a deliberate transition toward project-based learning (PBL) [17]. Reflection prompts help students extract design-relevant insights that can inform the direction of their final course projects. Students are encouraged to articulate early-stage opportunity statements based on the themes that emerged during the discussion. Instructors can review these synthesis outputs in a dashboard view, enabling them to identify emerging project clusters and provide timely feedback.

5 Preliminary Evaluation

We conducted a preliminary classroom deployment of DiaryQuest with 11 undergraduate students in an HCI course. Students completed the full structured reflection activity, including diary writing, App Group and Theme Group discussions, and final synthesis. To evaluate their experience, we collected feedback through a post-activity survey containing Likert-scale and open-ended questions.

Students responded positively to the structured process. The analytics dashboard was rated 4.55/5, with multiple participants reporting that the word clouds and emotion timelines helped them spot patterns in their reflections. The theme-based expert group phase received the highest ratings (4.8/5), with students stating that regrouping by theme allowed them to "see more diverse perspectives" and "understand how similar feelings arise in different apps." The image collages used in Theme Groups were also well received (4.55/5); students described them as "visually engaging" and noted they helped "tell a clearer story" and made abstract themes easier to compare across contexts.

The App Group discussion features, including peer image sharing and voting, were described as "easy to follow" and "less awkward than free-form discussion," with several students appreciating how prompts and visuals lowered the barrier to participation. Importantly, students reported that the reflection process deepened their understanding of user experience and directly shaped the direction of their final design projects. Several credited the structured synthesis prompts with helping them identify compelling opportunity areas they "would not have noticed on their own."

6 Conclusion

This work introduces a structured reflection framework that combines diary study and focus group discussion to support collaborative interpretation of user experience in educational settings. The framework guides students through a multi-phase process of diary writing, focus group discussion, and guided synthesis. We extended DiaryQuest, a lightweight tool that incorporates visual scaffolds, AI-assisted grouping, and a Jigsaw-inspired workflow to support this process. The approach helped students articulate personal experiences, engage with diverse perspectives, and generate design-relevant insights through guided synthesis. These findings suggest broader potential for structured reflection as a bridge between experience-centered inquiry and early-stage design. In future work, we aim to explore asynchronous use, multi-classroom scaling, and long-term impacts on reflective practice.

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