

Promoting Real-Time Reflection in Synchronous Communication with Generative AI

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Real-time reflection plays a vital role in synchronous communication. It enables users to adjust their communication strategies dynamically, thereby improving the effectiveness of their communication. Generative AI holds significant potential to enhance real-time reflection due to its ability to comprehensively understand the current context and generate personalized and nuanced suggestions. However, it is challenging to design the way of interaction and information presentation to maintain the real-time workflow rather than disrupt it. In this position paper, we present a review of research on systems designed for real-time reflection in different synchronous communication scenarios. Based on that, we discuss how to design the human-AI interaction to support real-time reflection in synchronous communication scenarios.

CCS Concepts: • **Human-centered computing** → **Empirical studies in HCI**; • **Interactive systems and tools**;

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1 Introduction

The definition of reflection in HCI field, as suggested by Eric et al.[2], is “reviewing a series of previous experiences, events, etc., and putting them together in such a way as to come to a better understanding or gain some sort of insight”. It is considered a central process in many fields, such as healthcare[5, 10], education[18], and design[6]. In HCI field, there is a significant body of research on the design for reflection[2]. However, they often focus on fostering reflection after the fact rather than enabling reflection in real time. Real-time reflection, on the other hand, is particularly useful in synchronous communication scenarios[1, 4, 11, 17] as it allows individuals to consciously evaluate and adapt their communication rather than recalling the entire process afterwards [15, 16].

Despite its potential benefits, real-time reflection is inherently challenging for individuals. In synchronous communication, speakers need to actively contribute to the ongoing dialogue, leaving little cognitive bandwidth to reflect on past interactions. Moreover, in many cases, it is difficult for the speaker to realize when their communication is unclear or misaligned, since there is a lack of immediate feedback from the audience. For example in contexts like remote communication, some nonverbal communication cues will be hindered, making it hard for the speaker to gauge the audience’s reactions. In solo practice, it is also hard to reflect in real time, as there is no audience.

In recent years, there has been a rising number of work that uses technological intervention to support reflection during the activity. In educational settings, real-time reflection has been specifically targeted to improve instructor-learner interactions and enhance teaching strategies. For example, Glancee [11] developed a comprehensive learning status detection algorithm to help instructors grasp the learning status of students in online synchronous

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Table 1. Overview of Real-Time Reflection Systems

Ways to support real-time reflection		The role of Generative AI in the system	Interaction Paradigm
Increasing user's contextual awareness	Augmenting/Simulating Audience Feedback [1, 13, 14]	Understand the conversation and generate feedback as an audience	User-initiated information check [7, 14, 17], Proactive system notification [13, 17]
	Aggregating Audience Status [7, 11, 12, 15, 17]	Traditional NLP/CV techniques are used, no need for Generative AI	
	Real-time Summary of Past Conversation [3, 4]	Identify topics, summarize, and analyze the conversation	Collaborative direct manipulation [4], Real-time monitoring [3]
Evaluating user's performance and providing actionable suggestions	Providing Expert Suggestion[13]	Understand the conversation and generate suggestion as an expert	Proactive system notification

classes. EduLive [7] achieved a similar purpose by aggregating learners' transcript-based annotations. There is another line of work focus on promoting reflection in online meeting. For example, TalkTraces [3] captures and visualizes verbal content in meetings to help participants reflect on conversational dynamics. MeetMap[4] uses large language models (LLMs) to provide mapping of collaborative dialogue in real-time in online meetings to help participants track the structure and flow of conversations, which is the first step in reflection[8]. Moreover, Joshua [12] brings the speech visualization mechanic into VR space to help participants reflect on conversational imbalances. Beyond these, real-time reflection in practice settings has also been explored to help individuals refine their skills. TutorUp[13] utilizes LLM to provide immediate and personalized feedback to help novice tutors better engage with their students. AudiLens[14] leverages LLMs to simulate diverse personas of the audience and generate real-time feedback.

In this position paper, we review existing systems designed for real-time reflection in synchronous communication and notice a trend of using Generative AI to support this process. We conclude how Generative AI can enhance the real-time reflection process and the limitation of existing systems. Based on that, we further discuss the design implications for using Generative AI to scaffold real-time reflection in synchronous communication and future research directions in this area.

2 Method

Given our precise focus on real-time reflection in synchronous communication, we first identified common synchronous communication scenarios where real-time reflection is especially useful. These scenarios include remote communication, such as remote meetings, lectures, and presentations, as well as practice speech. We searched in the ACM Digital Library using keywords 'meeting', 'reflection', 'online classes', 'presentation', 'practice', and 'training'. To ensure that our review captures the most recent trends in this area, we filtered the collected papers based on their year of publication, focusing only on those published in the last five years.

Finally, there are 11 papers that satisfy the conditions. We conclude on ways to support real-time reflection, the role of Generative AI in the system, and the interaction paradigms.

3 Results

3.1 How Real-time Reflection of Synchronous Communication is supported?

We concluded the ways to support real-time reflection. We conclude them into two categories, one is supporting reflection through **increasing user's contextual awareness**, and the other is **evaluating user's performance and providing actionable suggestions**.

The first three rows in Table 1 belong to the first category. In synchronous communication scenarios, it can be challenging for the speaker to comprehensively understand the audience's status and feedback in real time. This is because remote communication often hinders access to nonverbal cues, such as facial expression, etc. Even for in-person situations, the speaker's focus on delivering the content might prevent them from noticing the subtle change among audiences. Therefore, using AI to analyze the current situation comprehensively and present the results to the speaker in a glanceable way could help them reflect on their performance in real time. Additionally, providing a summary of past conversations can assist in reflection, as it allows the speaker to compare the discussion with their planned agenda, helping them stay on track and avoid deviating from the topic.

In addition to the methods mentioned above, providing professional feedback or suggestions from experts can also enhance reflection in synchronous communication, especially in domains that require specialized knowledge, such as teaching. In such scenarios, expert insights can offer valuable guidance, helping participants refine their approach and improve the quality of communication in real time.

3.2 What's the role of Generative AI in supporting real-time reflection?

We found an increasing trend in using Generative AI to support real-time reflection. Even for functionalities that could be implemented using traditional NLP techniques, many systems still opt for LLMs because of their higher flexibility. LLMs can dynamically handle a wide variety of tasks and synthesize results by combining inputs from diverse sources. Moreover, the generative capabilities and few-shot learning ability of Generative AI present new opportunities for real-time reflection. Specifically, LLMs can act as an audience[14] or, by prompting them with some domain knowledge, fine-tuning, or retrieval-augmented generation (RAG), they can serve as experts[13] in particular fields. This enables them to provide nuanced, contextual, and professional suggestions that enhance the reflection process.

3.3 Interaction Paradigm

In synchronous communication, the timing of providing information to the user is important. Different interaction paradigms are proposed to ensure a suitable timing. They range from fully user-initiated modes to fully automated approaches. In user-initiated modes[7, 17], users take full control, deciding when to access the information they need. In semi-automated modes[13, 14], the system proactively determines when to notify users about new and important information, and the user can decide if they would like to check it now, striking a balance between automation and user agency. Additionally, TalkTraces[3] displays all relevant information continuously for users to monitor and review in real time, saving the user effort to interact with the system, but also reduced the sense of agency.

In addition, intuitive, immediate, and visible interactions, such as direct manipulation, are applied in such systems to make operations natural and efficient.

4 Design Implications for Promoting Real-Time Reflection in Synchronous Communication with Generative AI

Based on our analysis of existing systems, we can see the significant potential of Generative AI to improve real-time reflection in synchronous communication scenarios. However, the current design is not perfect. We

analyze the limitations of current systems based on the findings of the user study and propose the following design implications.

4.1 Addressing the Lack of Interpretability

One of the key challenges that users face when using systems to support real-time reflection is the lack of interpretability in AI-generated results. When system outputs deviate from user expectations, it can lead to confusion, distrust, and increased cognitive load. To address this, designers should consider incorporating lightweight explanations or visual indicators that clarify how AI generated specific results, without overwhelming users with excessive information. For example, including brief annotations or contextual hints on dashboards can help users build trust and better understand the system's outputs.

4.2 Leveraging Proactiveness to Reduce User Workload

Users in synchronous communication scenarios often appreciate systems that proactively assist them, as long as the timing and relevance of proactive actions are appropriate. Generative AI can identify critical moments where users might need support and provide timely notifications or suggestions. This reduces the number of manual steps required for interaction and reduces the user workload. For example, proactive summarization of conversations or agenda tracking can help users focus on their primary tasks without having to search for information manually.

5 Conclusion and Future Directions

In this position paper, we explore the opportunities and challenges of promoting real-time reflection in synchronous communication with the support of Generative AI. Building on the concept of 'Thoughtful AI', recently proposed by Xingyu et al. [9], we envision future systems could go beyond the relatively rigid interaction paradigm of turn-based interaction where the user takes the full initiative. The paradigm of sending notifications when there is something important [13] is a step further towards improving the interaction dynamic; however, the potential of Generative AI extends beyond such proactive approaches. For example, Generative AI can initiate a conversation to understand and process more complex information requests from the user, for example, switching between different roles as expert and audience, to provide feedback.

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