Engaging Learnersourcing with an AI Social Agent in Online Learning

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ABSTRACT

Engaging students in creating novel content, known as learnersourcing, is emerging in online learning environments. Learnersourcing engages students in active, higher-order learning activities, provides rich and timely feedback, and supports personalized learning. However, engaging students in voluntary learnersourcing activities remains a significant challenge. While extensive research has explored various strategies to enhance student motivation, the potential for building social connections among online students to boost learnersourcing motivation remains underexplored. To address this gap, we propose a system that integrates SAMI, an AI social agent that facilitates AI-mediated social interaction. The proposed system helps online students build and maintain social connections within learnersourcing platforms, aiming to foster both intrinsic and extrinsic motivation. Our approach provides a novel solution to the challenge of learnersourcing engagement.

CCS CONCEPTS

• **Human-centered computing** → **Collaborative and social computing**.

KEYWORDS

Learnersourcing, AI-mediated social interaction, Online learning

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1 INTRODUCTION

Engaging students in voluntary learnersourcing activities is a significant challenge for instructional staff in online learning environments. Although these activities help improve learning outcomes, students often choose not to participate in them. Requiring students to participate in learnersourcing activities can achieve higher engagement but result in lower quality output [10].

Extensive research has explored various strategies to enhance student motivation to address this challenge. Motivations for engaging in learnersourcing can be categorized as either intrinsic (e.g., learning a skillset, inherently interesting or enjoyable) or extrinsic (e.g., external rewards) [10]. Strategies to boost intrinsic motivation include conveying the goal of learnersourcing [7] and emphasizing its potential benefits [8], but these approaches often rely on the student's initial motivation levels [10]. Grades [3] and gamification [5] use extrinsic motivation mechanisms but might reduce the student's autonomy and harm intrinsic motivation [2].

The potential for building social connections among online students, which can enhance both intrinsic and extrinsic learnersourcing motivation, remains underexplored. While existing research has explored extending and incorporating social interactions to motivate students, few studies have examined how social connections influence learnersourcing motivation.

To bridge this gap, we propose a system to facilitate social connections among online students in a learnersourcing system, aiming to foster both intrinsic and extrinsic motivation. We adopt artificial intelligence (AI)-mediated social interaction [11] and introduce SAMI, an AI social agent that helps students build connections based on commonalities. This paper will briefly describe the design and functionality of SAMI, present the proposed system in detail to envision how SAMI can support learnersourcing activities, and discuss future research questions.

2 DESIGN AND IMPLEMENTATION OF SAMI

SAMI (Social Agent Mediated Interactions) is an AI social agent that facilitates the building of social connections among online students through AI-mediated social interaction. AI-mediated social interaction, as defined by Wang et al. [11], is "the AI-facilitated process of building and maintaining social connections between individuals through information inferred from people's online posts." SAMI addresses the pressing need for social connections, and the challenges of remote social interactions that online students often face, thus enhancing their sense of community and engagement in the learning process [11].

SAMI has been successfully running in several classes in Georgia Tech's Online Master of Science in Computer Science (OMSCS) program across eight semesters. It integrates seamlessly into the class discussion forums where students can post self-introductions and participate in academic and social discussions.

2.1 SAMI Versions and Functionalities

For a full description of SAMI, see [4]. Here, we focus on the features of SAMI that are relevant to the content of this paper. SAMI employs Natural Language Processing (NLP) to extract entities

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such as hobbies, locations, or academic interests from students' self-introduction posts in the "Introduce Yourself to SAMI" thread. The current version of SAMI generates personalized responses and suggests five potential social connections based on these shared identities. Students can click on a recommended name to view their introduction post and begin the interaction by clicking to say "Hi" (Figure 1).

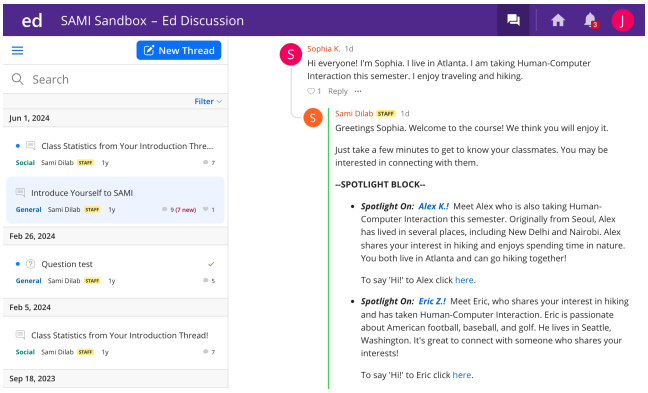

Figure 1: An example of a response to a self-introduction post from the current version of SAMI.

Future versions of SAMI aim to expand its functionality by facilitating the building of social connections that go beyond the initial self-introduction post. It reads and processes all content that students post in the class discussion forum. By collecting and interpreting information from these posts, SAMI discerns students' interests in certain topics. It then generates personalized responses suggesting social connections to posts that indicate a student's interest in a particular topic when it identifies other students with shared interests (Figure 2). This advanced feature will encourage students to post frequently on the forum to improve the matching accuracy of social connection recommendations [11].

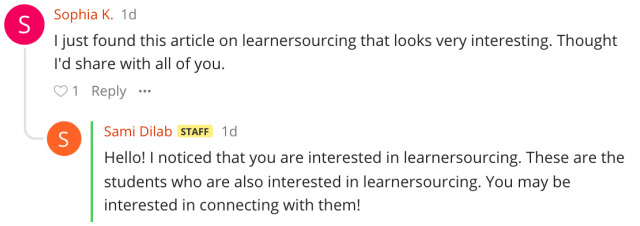

Figure 2: An example of a future version of SAMI response to any posts.

2.2 Class Discussion Forum System Design With SAMI

To further maintain social connections among online students beyond building a connection, we plan to update the class discussion forum's database to record these connections. When a student clicks to say "Hi" to a suggested student and decides to build a connection, the system logs this new social connection in the database. Then, every time a student creates a new post on the forum, the system triggers a notification to all connected students. These notifications include two links, one for viewing a post and one for creating a new post (Figure 3). This feature will not only keep students informed about each other's activities, but also encourage ongoing interaction, such as endorsing, commenting on, or creating posts.

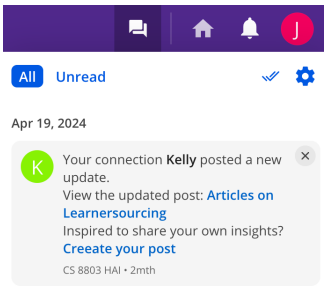

Figure 3: An example of a notification of a connected student's activity.

3 ENVISION OF SAMI SUPPORTING LEARNERSOURCING ACTIVITIES

3.1 Proposed System

Our system applies AI-mediated social interaction in a learnersourcing system to facilitate building and maintaining social connections among online students. We propose to integrate the AI social agent SAMI into learnersourcing platforms such as Ripple [6] or Peerwise [1]. This integration aims to help students build and maintain social connections based on common interests, with the goal of motivating students to participate in learnersourcing activities.

The workflow of our system progresses into three phases: (1) Building Initial Social Connections, (2) Maintaining Social Connections, and (3) Expanding Social Connections.

3.1.1 Building Initial Social Connections. During this first phase, SAMI provides online students with a starting point for building social connections. Students introduce themselves to SAMI through a self-introduction post or by creating a profile. SAMI uses NLP to analyze these profiles and extract key entities like hobbies, locations, or academic interests. The output data is passed to a Neo4j graph database, which uses a knowledge graph and pair-wise matching scores to generate personalized responses [4]. These responses suggest potential social connections with shared interests. Students can click on a suggested student's name to view their introduction and begin the interaction by clicking to say "Hi", facilitating the building of new social connections (Figure 1).

3.1.2 Maintaining Social Connections. During this phase, SAMI helps students maintain lasting social connections that extend beyond the initial interactions. The system's database logs all the social connections between online students. When students participate in learnersourcing activities, the system triggers notifications to their connected students. These notifications include two links

to view the activity and participate in the learnersourcing activity (Figure 3). Such a setup will not only allow students to inform each other's activities but also allow interactions such as endorsements, evaluations, and feedback, thereby providing opportunities to promote continued interaction.

3.1.3 Expanding Social Connections. In this phase, SAMI helps students to expand their social connections beyond their initial connections. SAMI captures and analyzes all students' activities, allowing it to detect specific interests and facilitate new connections. For example, if a student regularly participates in a learnersourcing activity centered on a particular topic, SAMI will identify this ongoing interest and connect them with students who have similar areas of focus.

3.2 Integration of SAMI into Existing Learnersourcing Platforms

Expectations for integrating SAMI into existing learnersourcing platforms center on enhancing both intrinsic and extrinsic motivation of online students' learnersourcing participation. We expect SAMI to foster intrinsic motivation by promoting autonomy, competence, and relatedness, which is consistent with Deci and Ryan et al.'s self-determination theory [9]. Specifically, SAMI aims to foster (1) autonomy by encouraging voluntary participation without relying solely on external awards, (2) competence by building a sense of capability through endorsement and feedback, and (3) relatedness by fostering a sense of community through building and maintaining social connections based on shared identities. Additionally, SAMI will enhance extrinsic motivation through the recognition provided by notifications, thus providing an opportunity to enhance learnersourcing engagement through a dual motivational approach.

Within RiPPLE [6], a popular learnersourcing adaptive educational system, the integration of SAMI will significantly enhance its features to motivate online students' participation in learnersourcing activities. RiPPLE utilizes gamification mechanisms, such as leaderboards, which effectively increase extrinsic motivation but may undermine students' intrinsic motivation by reducing their autonomy [2]. The integration of SAMI aims to balance these strategies by simultaneously enhancing both intrinsic and extrinsic motivations.

Also, RiPPLE's 'Study groups' feature, which assists students in finding study partners, currently offers few filters — only language and timezone information — which do not sufficiently narrow down options. Students have to manually sift through all the other posts to start building social connections. SAMI's integration will simplify this process, reduce the cognitive load on students, and boost both the likelihood and motivation to form meaningful social connections.

4 FUTURE RESEARCH QUESTIONS

After implementing the proposed system, during the research phase, we aim to explore the design space of AI-mediated social interaction in a learnersourcing platform. We identified three key research questions:

- **RQ 1**: Does AI-mediated social interaction enhance online students' motivation to participate in learnersourcing activities?
- **RQ 2**: What are the secondary effects of AI-mediated social interaction in learnersourcing activities?
- **RQ 3**: What are the challenges and lessons for designing AI-mediated social interaction in learnersourcing platforms?

We seek to explore both the primary impacts of AI-mediated social interaction on online students' motivation and the second-order impacts on learnersourcing activities and student perceptions. Additionally, we plan to discover the challenges and derive lessons for designing effective AI-mediated social interaction in learnersourcing platforms, with a focus on how these activities are uniquely tailored for educational contexts compared to more diverse social platforms.

5 CONCLUSION

The overarching aim of this research is to explore the potential for building social connections to enhance learnersourcing motivation. To examine this potential, we designed a system to facilitate the building and maintaining of social connections among online students engaging with learnersourcing. The system enables AI-mediated social interaction through SAMI, an AI social agent that helps students connect based on shared interests. Our proposed system aims to foster both intrinsic and extrinsic motivation, providing opportunities for novel solutions to the challenges of learnersourcing engagement.

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