Guide, Safety Net, Project Tester, and More:
Investigating the Roles of Facilitators in an AI Summer Camp

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Abstract: Summer camps have become popular for introducing K-12 learners to computer science (CS) and artificial intelligence (AI) in informal learning environments. Facilitators play crucial roles in guiding and engaging learners in these contexts, but there is limited research on their roles in informal AI learning. This paper examines facilitators' dialogues with campers in a middle school AI summer camp, identifying eight major facilitator roles. The roles differed depending on group dynamics and project phase. The paper provides empirical grounding to define facilitators' roles in AI learning and guide the design of professional development for camp facilitators.

Introduction

Informal learning settings, such as summer camps, are becoming more popular in AI education due to their less structured nature and lack of school-based performance evaluations (Callanan, Cervantes, & Loomis, 2011). Research has shown that summer camps improve students' learning, build confidence in AI and STEM fields, and encourage interest in pursuing future careers in STEM (Bhattacharyya, Mead, & Nathaniel., 2011; Yi, Gadbury, & Lane, 2021). AI summer camps often introduce innovative technologies such as machine learning and conversational AI and employ hands-on and project-based learning, aligning with the constructionists' view of learning. However, engaging young learners in hands-on activities and project-based learning is often challenging without proper guidance and facilitation (Roque & Jain, 2018).

Facilitators play a critical role in constructivism learning, particularly in informal learning settings, as they often determine the quality of the camp experience (Owens & Browne, 2021). However, there is currently no comprehensive framework for understanding facilitators' roles in AI education. Previous frameworks have focused on specific aspects of facilitation or specific contexts (Wang, 2008; Owens & Browne, 2021), making it challenging to apply them to AI learning. Therefore, this study aims to explore the interaction dynamics between facilitators and learners in an AI summer camp and provide a theoretical ground for defining and systemizing the roles of facilitators in informal AI learning. This research addressed the following research questions (RQs): **RQ1.** What are the roles of camp facilitators in informal AI learning settings? **RQ2.** How do the facilitators' roles vary by facilitators and the project phase?

Methods

A basic interpretive qualitative methodology (Merriam & Grenier, 2019) was used to label the interactions between the facilitators and campers and draw themes from them. Before the study, we obtained approval for this study from the University of Florida's Institutional Review Board.

In the summer of 2021, we conducted an in-person two-week-long AI day-camp to provide middle school learners with a learning opportunity to design and develop conversational AI in the southeast region of the United States. Fourteen campers participated, including two girls and 12 boys, 11 Black/African American, and 3 White/Caucasian students. We recruited seven camp facilitators, including five undergraduate, one graduate student, and one post-doctoral researcher, four women and three men, 2 Black/African American, 2 Asian, and 3 White/Caucasian.

The data was collected over the three days in the second week. On day 6, campers brainstormed the project ideas; on day 7, they engaged in the initial chatbot development, and on day 8, they did final touch-ups and connected the projects to Google Home speakers. Each camper pair was assigned to one facilitator and their interactions were recorded using OBS software on the study laptops. The recordings were later transcribed and anonymized by the research team.

This study framed facilitation into four categories; cognitive, social-emotional, managerial, and technical and defined the interactions in each category (Graesser & Person, 1994; Owens & Browne, 2021; Wang, 2008).

Two researchers labeled one full recording together for further refinement of the initial coding scheme. They worked independently to label 20% of the transcription and iteratively reviewed and improved the coding scheme until satisfactory inter-rater reliability was met (Cohen's kappa = 0.85). Then, the rest transcriptions were labeled independently. We grouped the similar interactions yielding eight themes. To increase the credibility of our findings, we conducted a member checking and data triangulation using facilitators' daily reflection notes.

Results

After coding 1,847 interactions between facilitators and campers, we derived eight themes, which we present as eight primary roles of facilitators; Cognitive Coach (624; 33.8%), Guide (288, 15.6%), Task Coordinator (247, 13.4%), Motivator (198, 10.7%), Technical Supporter (168, 9.1%), Bridge Builder (126, 6.8%), Safety Net (117, 6.4%), and Project Tester (79, 4.2%). We are also interested in how the frequency of each role varied among facilitators and by project phases (see Figure 1).

Figure 1

Distributions of facilitators' roles by individual facilitators (left) and different phases of the project (right)
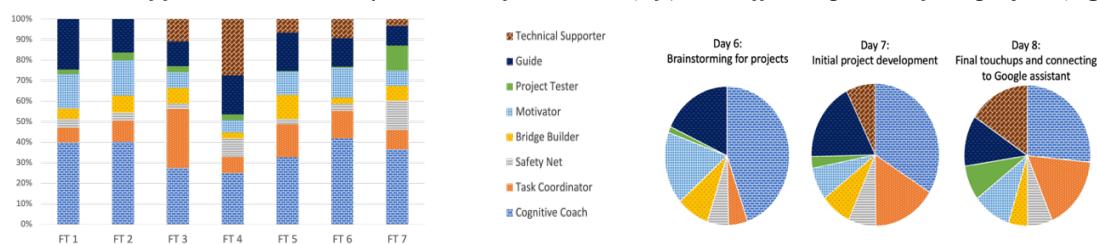
The variation of distribution among individuals was due to the need to adjust their roles depending on the campers. For example, campers in FT 4's group may need more help with technology because of limited digital literacy. In contrast, FT 6 might need to act as a motivator more because campers were easily distracted. Facilitators also adjusted their roles depending on the project phases. For example, "Cognitive Coach" and "Motivator" peaked on day 6 because it was a Monday, and many campers needed a refresher and review on the concepts. "Technical Supporter" emerged from day 7 when campers started developing their projects, and the percentage enlarged to day 8 as they advanced the projects using more complex features in Dialogflow. In contrast, "Bridge Builder" began to decrease on day 8, as campers had already spent enough time building rapport with their partners.

Conclusion

By examining the roles of facilitators in AI summer camp settings, this study provides insights into the competencies required for camp facilitators and designing professional development for them. This study's findings can contribute to the development of a comprehensive framework for understanding facilitators' roles in AI education, ultimately supporting the growth of AI and STEM education.

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