Undergraduate Facilitators as Role Models for Middle School Learners within an AI Summer Camp

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ABSTRACT

As Artificial Intelligence (AI) becomes ubiquitous in children's lives, it is crucial to introduce new and effective ways to teach the younger generation about AI. This study describes the experience of training undergraduate students as middle school AI summer camp facilitators. These undergraduates participated in a professional development session prior to camp for 9 days (54 hours), and then facilitated AI learning and camp activities within the two-week camp. Our findings indicate that the undergraduate facilitators benefited greatly from this experience, in turn providing benefits to the middle school learners. The undergraduates developed both professional and conceptual skills. By interacting with the facilitators as "near-peers", the students learned about AI in a fun, engaging, and supportive way. These findings contribute to our understanding of how to effectively teach young learners about complex AI concepts.

CCS CONCEPTS

• **Computer Science Education**; • **Conversational Agents**; • **Undergraduate Training**;

KEYWORDS

Artificial intelligence education, middle school, informal learning, summer camp, facilitator, professional development

1 PROBLEM AND MOTIVATION

As artificial intelligence (AI) becomes prominent in our daily lives, there is a growing need to educate children in CS and AI through relevant and engaging manners [5, 17, 19]. Despite progress in resources for AI education [2, 12, 20], there is a shortage of K-12 computer science teachers [15]. Many schools struggle to find teachers who are able to introduce CS concepts in an engaging manner to middle school students [13]. To address this, some studies have leveraged alumni and undergraduates to promote CS education

in middle school environments [7, 18]. In this study, we recruit undergraduate students to facilitate activities in a middle school AI summer camp. Undergraduate students possess a youthful energy and a closer age proximity to middle school students, making it easier for them to relate to and inspire younger students [4]. With extensive professional development, the undergraduates also possess sufficient academic knowledge and pedagogical skills to confidently lead AI learning activities. This study aims to answer two research questions: **RQ1:** In what ways did the professional development session help to enrich the undergraduate facilitators' experiences regarding the camp? **RQ2:** In what ways did the facilitators benefit the camp learners' experience?

2 BACKGROUND AND RELATED WORK

This study surrounds a two-week summer camp for rising 7th and 8th graders. The summer camp sought to shape students' interests and attitudes toward AI through conversational app development experience using an application known as AMBY [10, 16]. Undergraduates, trained to best teach AI concepts to students, led the summer camp, which was conducted for three summers (2021-2023). The camp has developed a complete AI curriculum [16] and a novel interface, AMBY, for youth to create conversational apps [10, 11].

Researchers have studied teaching methodologies and strategies to engage young learners in a relatable manner. The use of "near-peer" mentoring can not only teach concepts, but also spark social-emotional skills within these students [14]. Middle school students relate better to near-peer mentors, as well as connect more deeply with their sense of self through building relationships [4, 9]. Additionally, engaging near-peer mentors enhance students' enthusiasm and interest for fields in computer science [1]. Mentors also benefit from interacting with middle school students, developing their interests, proficiency, and skills in computer science.[3].

Facilitators serve as an example of near-peer mentors, which emphasizes the importance of teacher-student interactions, provides a great deal of support, and frequently encourages the student [8]. Facilitators can fit into a multitude of different categories such as trust builder, enabler, inquirer, and direction setter [6]. Our camp adopted these diverse roles to allow facilitators to tailor their mentorship to the unique learning needs of the learners; therefore fostering a more inclusive and effective educational experience.

3 UNIQUENESS AND APPROACH

3.1 Professional Development

We recruited undergraduate students (regardless of their major and prior AI experience) from a university who are interested in teaching middle school students about AI as camp facilitators. Before the camp, facilitators underwent six weeks of training in research

applications and professional development (PD), totaling 54 hours across nine sessions. These sessions were led by two PhD students, an experienced undergraduate facilitator, and two faculty. The PD sessions were designed to prepare facilitators to lead the camp sessions successfully and with confidence. The PD covered a variety of topics including camp curriculum, software (AMBY) development, pedagogies such as Universal Design for Learning (UDL) and Culturally Responsive Pedagogy (CRP), and practical strategies for teaching middle school students. Besides PD, the facilitators also participated in a research project to gain insights regarding computer science research.

3.2 Camp Setting

This study took place during an informal two-week summer camp in Gainesville, Florida, USA, and students engaged daily from 9:00 am to 5:00 pm each weekday. Daily sessions, led by the facilitators, were scheduled in 30-minute blocks and covered varying topics, including General AI lessons, Conversational AI lessons, Unplugged Activities, Just-for-fun Activities, or AMBY Project Development.

4 RESULTS AND CONTRIBUTIONS

4.1 Facilitator PD and Camp Experience

We interviewed six undergraduate facilitators (labeled from FT1 to FT6) both after the PD (prior to the camp) and after the camp. These facilitators shared their experiences regarding the PD, and addressed how helpful the PD was in preparing them for camp.

4.1.1 Conceptual Knowledge Learned From PD. During the PD sessions, a variety of lessons were introduced regarding teaching practices for our population of students from diverse educational, linguistic and cultural backgrounds. Regarding the understanding of the UDL (Universal Design for Learning) concept, a facilitator described it as "*make[ing] learning accessible for all students equally*" (FT3). The facilitators experienced "*learner variability*" and understood that "*everyone has...different strengths and assets and weaknesses*". This strongly helped the facilitators during the camp because it opened them to "*...recognize any barriers that they [the students] are facing and try to fix that without judgment*" (FT1).

An important teaching practice was understanding middle school students' behaviors and adapting to them. For example, understanding self-esteem issues allowed the facilitator to address such problems effectively. Regarding the tendency of losing interest quickly due to their limited attention span, the facilitators learned to "*really involve them [the students] in the teaching process*" by "*asking a lot of questions to encourage discussion*" or by facilitating "*an activity that teaches the information instead of just spewing the information at them when they're less likely to listen to it*" (FT1).

Lastly, facilitators developed conversational agents using AMBY during PD sessions, which was crucial for preparing them to guide students in creating their own. One facilitator believed this was the most important aspect of the PD "*because...one of the main purposes of the camp is to help these kids build their chat bots*" (FT2). Apart from gaining software experience, this aspect of the PD was also integral to the camp curriculum because facilitators' projects were used within lessons to clarify AI concepts and guide students in project development.

4.1.2 Practical Skills Learned From PD. The facilitators also gained a variety of essential life skills from their professional development. It yielded substantial proficiency in public speaking, as the facilitators consistently conveyed educational materials to the campers each day. Some facilitators "*get nervous*" in front of groups of individuals, and therefore believed "*it was a really good exercise*" to further their everyday skills (FT1). Some facilitators felt that the PD increased their confidence "*in terms of teaching and working with kids*" (FT4). This led to a greater amount of authentic student-facilitator relationships, and increased the morale of the camp. Facilitators also learned to ask a engaging questions to foster interest in the concepts being taught.

4.2 Learner Experience

At the end of the camp, 16 learners completed a post-camp survey regarding their experiences during the camp. Students responded on a 4-point Likert scale of the following six statements for analysis: (1) "I felt encouraged by the camp facilitators", (2) "I felt included by the camp facilitators", (3) "I felt supported by the camp facilitators", (4) "In this camp, my facilitator explains why what we are doing is important", (5) "In this camp, my facilitator helped me pick a project that interests me", (6) "In this camp, my facilitator helped our group solve difficult problems."
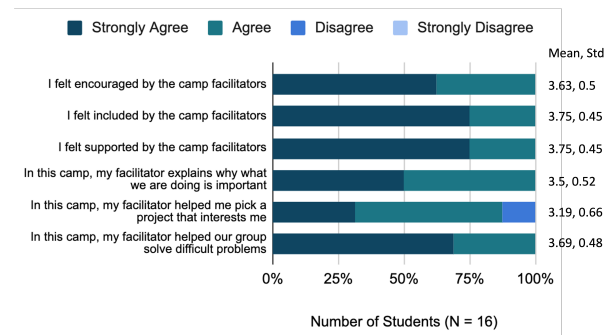

Figure 1: Student Post-camp survey responses related to the effectiveness of the facilitators (including mean and standard deviation for each item)

Figure 1 shows that students responded positively to these six statements, with the majority either agreed or strongly agreed. The mean and standard deviation for this scale is 3.583 and 0.385, indicating students believed that facilitators overall benefited their experience by creating a fun, encouraging, and inclusive environment.

4.3 Conclusion

The overarching goal of this study was to explore the impact of undergraduates as facilitators in a summer camp on enhancing learning experiences for both undergraduates and younger students. The findings suggest that with adequate professional development, undergraduates not only enrich student learning but also acquire valuable skills, highlighting the mutual benefits of involving undergraduates as informal educators in informal learning environments.

5 ACKNOWLEDGEMENTS

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