

Designing Technology to Support the Hospital Classroom: Preliminary Findings

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ABSTRACT

Hospital teachers are state-employed educators who provide K-12 instruction to children in the hospital. We conducted research to understand how technology is used in hospital classrooms, an area which has been relatively underexplored. We conducted semi-structured interviews with five hospital teachers to understand their experience of using technology in and outside the classroom. Our findings revealed that hospital teachers often rely on older curricula given the changing education atmosphere; learning is often assessed through in-classroom observations of mastery; and technology and internet use by students is often restricted, which may inhibit opportunities to use AI and other technical resources in the classroom. We contribute a deeper understanding of technology use in the hospital classroom.

CCS CONCEPTS

• **Human-centered computing** → **Empirical studies in interaction design**; • **Applied computing** → **Interactive learning environments**.

KEYWORDS

hospital teachers, hospital education, generative AI, curriculum development, lesson planning

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1 INTRODUCTION

Hospital teachers are specialized teachers in the hospital that provide instruction to children in grades K-12. These teachers develop custom lesson plans for the diversity of students admitted into the hospital that are accessible and meet state learning standards. Developing an engaging lesson for the diversity of students in the hospital setting can become onerous in this stressful career. In this study, we conducted a preliminary investigation to explore hospital teachers use of technology in and outside of the classroom.

We found that hospital teachers often rely on older curricula given the changing education atmosphere; learning is often assessed through in-classroom observations of mastery; and technology and internet use by students is often restricted.

We contribute a deeper understanding of technology use in the hospital classroom.

2 RELATED WORK

In this section, we review literature related to designing in the hospital classroom and generative AI in the K-12 classroom.

2.1 Hospital teachers

There is limited research on the experiences of hospital teachers in the United States, their technology use, and the opportunity for AI in the specific work context.

However, we found a recent literature review that discusses literature focused on hospital teachers around the world. Avalos and Fernandez [2] conducted a systematic literature review of hospital teacher-related research from 2000 to 2020, where they found that most research in this area focused on the heterogeneous dimensions of work conducted by hospital teachers. Additionally, research between 2000 to 2020 also focused on the perceptions of hospital teachers by students and caregivers. They found that most research about hospital teachers explored the experiences of mostly female hospital teachers based in countries outside of North America (e.g., Australia, Poland, Israel, Finland, and South Africa) [2]. Given the complexity of the role of hospital teachers around the world, researchers have found it difficult to generalize the population. With

this in mind, the authors encouraged more research on the perspectives of male hospital teachers, the development of policies, and the extension of frameworks [2]. We extend the literature on hospital teachers by examining the recent experiences of hospital teachers in the United States.

More recent research articles – post 2020 – have explored the mental well-being of hospital teachers. For example, Malkowska-Szkutnik et al. [7] explored the well-being of hospital teachers. They found that Polish hospital teachers received no mental health support, and the teachers perceived that their role was underestimated and marginalized. It is clear that research after the systematic literature review of Avalos and Fernandez [2] continue to explore the professional identity of hospital teachers. Another example can be seen in the research of Hen and Gilan-Shochat [6] where they interviewed Israeli hospital teachers to understand how their complex work environment differs from a traditional school environment. They found that hospital teachers saw their role as providing normalcy for students and supporting their continued education. Additionally, hospital teachers in the study saw their role differently from a traditional school environment as they had to contend with the hospital schedule and the varying stays of children. Overall, given the diversity of skills, backgrounds, and ages of the students, hospital teachers play a key role in developing a custom education. We extend this work by examining hospital teachers technology use in their work context.

2.1.1 Technology Use in the Hospital Classroom. Researchers who have designed around the hospital space most often focused on the design and educational experiences of the students in the setting. They have conducted co-design sessions with hospitalized children [8] or developed educational programming to teach computing concepts [4]. For example, researchers used the robotic kit, KIBO, to teach hospital students computational thinking [4]. They found they were able to achieve their objectives though the hospital school setting was very dynamic and student participation varied based on how long a student was in the hospital. We extend this literature by understanding technology use in and around the hospital classroom.

2.2 Generative AI in the K-12 classroom

Researchers have explored generative AI use and preferences in the K-12 classroom. In this section, we explore research that explores the best practices of using AI in the classroom, and preferences of AI.

First, a large number of researchers have explored understanding using AI to support computing education in mostly college courses. For example, researchers explored preferences of ChatGPT with first-year computing students and found there was enthusiasm to learn with the tool and the potential for new ways to program [10]. Another study explored creativity with generative AI in a computational Physics course. They found varied results in how students used generative-AI to support learning but saw generative AI had opportunities to support explaining concepts to learners[5]. Researchers have demonstrated that generative-AI has shown promise in it's use by primarily college students in a traditional classroom setting. We extend this research by exploring opportunities of generative AI in a hospital school or a non-traditional school environment.

Next, several white papers and research papers have been found to discuss best practices and lessons learned from using AI in the K-12 context. For example, researchers have explored the opportunities of using generative AI to support personalized learning environments. They found an effective use for AI when individual learning goals were clearly defined for a personalized curriculum. Another study explored the use of generative AI to develop computational thinking and professional learning in a pre-K-12 context. The researchers found that generative AI provided great prompts for conversation and could develop lesson plans close to the team's expectations by inputting specific information. [9]. We can conclude that the strength of generative AI lies in its ability to display suitable results within a dynamic learning environment. We extend this research by understanding the opinions of generative AI by state-employed hospital teachers – the individuals who may or may not choose to engage with the technology in the preparation of their class and the implementation of a lesson.

Overall, most researchers have explored generative AI in the college classroom, or educational settings focused on teaching computing skills. However, few researchers have explored generative AI to support creating resources in non-traditional classrooms and the perspectives of teachers on the use of AI in non-traditional classrooms. Our study bridges this gap.

3 STUDY DESIGN

We conducted semi-structured interviews with five hospital teachers to understand their work setting, use of technology, viewpoints on generative AI, and opportunities for new technology in this setting.

3.1 Participant Recruitment

We recruited hospital teachers across the United States. We sought diversity in terms of age, gender, and background to cover a wide range of experiences.

The research team piloted the study twice internally and edited the interview protocol to address concerns about interview fatigue and the Health Insurance Portability and Accountability Act (HIPPA) and the Family Educational Rights and Privacy Act (FERPA) concerns.

HIPPA is a US law designed to protect sensitive patient health information from being disclosed without authorization [3]. Additionally, FERPA is a US law that protects the privacy of records that contain information directly related to a student that are maintained by an educational institution [1].

Next, we used snowball sampling to recruit participants. One of our co-authors identifies as a hospital teacher and used their networks to recruit participants. Individuals interviewed were also asked if they knew anyone who would be a good fit for the study.

Before the interview, participants were emailed a consent form and asked to confirm that they identify as a hospital teacher. Lastly, at the end of the interview participants were provided a short demographic questionnaire.

3.2 Interviews and Demographic Survey

We performed the interviews using a semi-structured protocol that explored course preparation, course implementation, use of

technology, and perceptions of AI. At the end of the interview, we conducted a short demographic survey that included basic questions about gender, age, income, and educational level.

We conducted interviews via Zoom. Interviews ranged from 30 to 90 minutes, with the average length being about 40 minutes. Participants were compensated with a \$50 Amazon gift card for their time.

3.3 Data Security and Data Analysis

All interviews were audio recorded and transcribed. We followed a strict security protocol in handling participant audio recordings. All files were stored on our institution's Microsoft and Google cloud storage, which has been evaluated for security and approved by our institutional review board to hold sensitive data. In all work downstream of transcriptions, participant names were replaced with pseudonyms: Participant 1, Participant 2, etc.

The research team analyzed the interviews using thematic analysis. The team developed initial themes and each inductively coded a transcript. A final set of themes were identified after a series of discussions. The last author then coded all of the interviews with the pre-identified themes.

4 PRELIMINARY FINDINGS

All participants identified as women which matched prior studies that showed a large number of female participants [2]. Our participants worked as a hospital teacher for an average of 24 years, and most of the participants had a master's degree. All of the participants were located in the United States, but due to the small sample size and small hospital teacher community, we opted to not identify the work location of our participants. Classrooms ranged from bedside education to multipurpose rooms or large hospital halls where teachers supported students in their education. Furthermore, classroom size and time ranges also varied. Some classes were as small as one student and teaching blocks ranged from 30 to 60 minutes. Additionally, teachers experienced varied teaching support with some teachers having infrequent teaching aid support to other teachers having little to no support in their instructional area.

Below, we only summarize technology-specific opportunities and challenges that have not been detailed elsewhere.

4.1 Technology-use in and around the Hospital Classroom

4.1.1 Classroom Preparation. Many teachers relied on their past experience and trusted resources to support their teacher preparation. Using older lesson plans and their knowledge of the grade level helped them save time when preparing for their students. Participant 3 confirmed this by comparing the activities of other students at the same grade level, stating, "...I knew from these other second graders, [that] they were doing addition. So I'm going to do that with him [another student] also because it's likely that [all second graders] are doing the same thing." Participant 1 also echoes a similar sentiment, she states, "Truthfully, I have like a dozen things available for each subject. I tend to reuse them a lot." Both participants demonstrate a method of efficiency used by hospital

teachers to create engaging experiences with students by using tried-and-true methods of education.

4.1.2 Assessing Understanding and Engagement. Hospital teachers in the United States work in a constantly changing environment, and therefore, many teachers chose not to assign homework to students, aiming to provide a positive educational experience given the circumstances that led them to the hospital. When it comes to assessing students' learning and engagement in the classroom, most teachers relied on in-classroom activities. Some teachers also used technology to assess students, particularly their motor skills. For instance, participant 4 stated, "it's a sequencing game...and...I use that more as an evaluation tool. Let's say if I have a student that just had a traumatic brain injury, and I want to see how they are processing information now, I'll use this app, which is a sequencing game, to see if they are able to complete everyday tasks in the correct order." This example highlights the important role of observation in the work of a hospital teacher and how technology can support assessment.

4.1.3 Communication in the hospital ecosystem. The majority of teachers expressed the need for better communication between schools and medical staff regarding students' medical conditions and educational backgrounds. Surprisingly, parents and caregivers are often not involved in this process, but teachers make efforts to facilitate communication between the student's local school system and medical care team to ensure a smooth transition in and out of the hospital classroom.

For instance, participant 3 mentioned the inconsistency in communication with school districts, stating, "I would reach out to the schools and...sometimes you would hear back pretty quickly and some people never responded." When asked about discussing lessons with parents, participant 2 reflected on the communication process within the hospital, saying, "We don't really have much contact with parents. The kids are there for an average of six days. Sometimes we have kids who are there for months, but the average stay is six days. We get permission for the kids to attend school, address any questions they have about school, and that's pretty much it. We don't have parent conferences or consult with parents at all."

Furthermore, the same participant (participant 2) mentioned the limited knowledge of the medical conditions of the students, stating, "so we don't know the medical [condition]. We don't know anything quickly or psychologically about the kids when they come to us. The only information we have is if a student has an IEP (individualized education plan) or if they have a diagnosis of being on the autism spectrum. I might only know that kind of thing, and usually, I won't know until I've met them." Participant 2 highlights how communication across key groups (schools, medical team, and families) could be improved but may be limited due to a number of US laws and regulations including HIPPA, FERPA, or laws created to restrict the sharing of medical and minor-related data.

4.1.4 Challenges with Internet Access in the Modern Hospital. Most hospitals had limited use of internet access for the children in the hospital classroom. However, teachers had access to the internet for lesson planning and updating technology. Internet speeds varied, but were a conscious source of reflection for most teachers.

For example, participant 1 stated, “If I want to do something like update my iPad’s, I need to take them home one at a time to do it because the Wi-Fi in the hospital isn’t really strong enough to do that.” Participant 1 highlights the challenges of internet speeds when preparing to use equipment.

As it relates to lesson planning, most teachers accessed Google and YouTube to find resources for teaching their students. For example, participant 2 elaborates, “I mean I go and I’m constantly Googling like what’s the latest technology in education and just trying to see what might work...you know when I get new devices sometimes I go straight to YouTube to see how people are using them in their classrooms. Our setting is unique and so it’s kind of like I have to see how other people are using it and then think about how we can use it.” Participant 2 highlights the opportunity of using the internet to explore new ideas around lesson planning.

4.2 Use and Preferences of AI by Hospital Teachers

All of the teachers – with some caveats – were open to opportunities that engaged students and their work with more technology. For example, when asked about their opinion of generative AI in the classroom, participant 3 stated, “I’m against it for like my kids...[in] elementary, but for [generative AI use with] high school [students].” When asked to clarify their response, they stated, “high schoolers will have, I think, a better understanding of like what AI actually is and like what’s an appropriate time to use it...elementary age, they’re just so impressionable still...”. Participant 3 comment reflects the nuanced opinion of hospital teachers and the discretion they have over the use or non-use of technology in their classroom.

Shockingly, hospital teachers were open to engaging students with AI, despite the negative media coverage of generative AI at the time of the study. For instance, when asked about their knowledge of generative AI, participant 2 took some time to think and then responded, “...what I know is what I see in the media...I see a lot of stories that seem to imply there’s a lot of negative, you know, consequences of AI...I personally think there are a lot of positives too as like any other technology...”. While there was a readiness to involve students with AI, it also became clear that hospital teachers need training on the topic, particularly in the context of the hospital environment.

While most hospital teachers were not aware of common AI tools on the market or their current integration in some products, they were open to training and resources to enhance their classroom and overall awareness.

5 DISCUSSION

Hospital classrooms, unlike other non-traditional educational settings, are often state-operated classrooms that are an extension of the Department of Education for a specific state. This study aims to provide a clearer understanding of technology use in the hospital classroom. Based on our preliminary findings, we found that the hospital classroom is primed for technical innovations but there are some challenges that teachers experience and encounter that may limit technical innovations. For example, we found that internet access may be a hindrance in today’s hospitals and that engagement with technology is highly dependent on the teacher. With that in

mind, whatever new technology is produced in and around the hospital classroom will require training to support teachers.

Our research echoes past research that have examined global hospital classrooms [2]. Hospital teachers in the United States also experience highly dynamic hospital environments with varying classroom sizes and educational sessions [2, 6]. Given the variability of the classroom, one might find this setting difficult to design around; however, designing for the hospital classroom requires design elements that are flexible then restrictive.

Furthermore, we expand past computing research by examining the experiences of hospital teachers, which differs from previous computing research that examined educational technology use by students in the hospital classroom [4, 8]. We specifically looked at how hospital teachers curate an educational experience for their classroom and what networks are involved to ensure their educational experience is successful.

Future work should explore opportunities to co-create with hospital teachers to further support and design for their highly dynamic work experience.

6 CONCLUSION

In conclusion, HCI should consider the hospital classroom as a site for innovation especially as it relates to generative AI and the dynamic ability of using large language models to develop highly engaging hospital resources and tools for students and teachers. In our study, we have found the hospital classroom setting is ripe for educational technology innovation inside and outside of the classroom.

In this study, we sought to understand how technology is used around the hospital classroom. Through interviews, we identified opportunities and challenges in designing technology in and around the hospital classroom. These areas included classroom preparation, communication within hospitals as well as the broader school environment, and internet reliability. Our research raises future questions about what should be the standard for background knowledge for generative AI to be viable for implementation at hospital schools, and what content should be the focus for generative AI in non-traditional environments.

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