BOARD # 311: RAPID: K-12 teacher perceptions of artificial intelligence tool use in the classroom

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RAPID: K-12 Teacher Perceptions of Artificial Intelligence Tool Use in the Classroom

Introduction

The "AI Revolution" is accelerating, with new tools released daily. These powerful AI tools are used in far-reaching applications, ranging from personal assistants to creative engines, and are being developed and used across a wide range of industries, including education. The social and societal implications of this proliferation of AI tools, especially in educational settings, warrant investigating. Yet research regarding the implications of AI in education and best practices for using AI tools in the education industry is lacking, especially regarding the needs of teachers.

K-12 teachers have the potential to help students learn to interact responsibly with AI inside and outside the classroom. Also, teachers can use AI tools themselves to facilitate student learning and reduce the workload associated with teaching. While some AI-powered tools for teachers and student learners have been developed, a paucity of literature explores connections between AI tools and K-12 teachers' needs, or factors influencing teachers' interest and decisions to use AI tools in their classrooms. This project asks the overall research question: *How do K-12 teachers perceive AI tools and their impact on the workforce?* To answer this question, our one-year project leveraged a national survey of K-12 educators' perceptions of AI using an ecological agency framework.

Theoretical Framing

Ecological Agency

The guiding framework of our project is the ecological agency framework developed by Biesta et al. [1]. In the framework, agency is conceptualized as an individual's ability to act purposefully and feel in control of actions and the outcomes of those actions [1]. In this project, we conceptualize K-12 teachers as agents of change for the adoption of AI tools, who may feel more or less of a sense of agency over adopting AI tool use in their curriculum. Per the framework, components contributing to a sense of agency include past experiences, expectations of the future, and present cultural, structural, and material conditions that can be opportunities, barriers, and resources [1].

At the onset of the project, our team theorized several factors which might impact teacher's AI use based on Biesta et al.'s framework, including social supports or hindrances from other teachers or administrators, school and community resources and access to use AI tools, perceptions of added value of AI tools on teaching outcomes, opinions and ethical concerns about AI tools, and familiarity with AI tools from prior personal or professional use.

Ecological Systems Theory

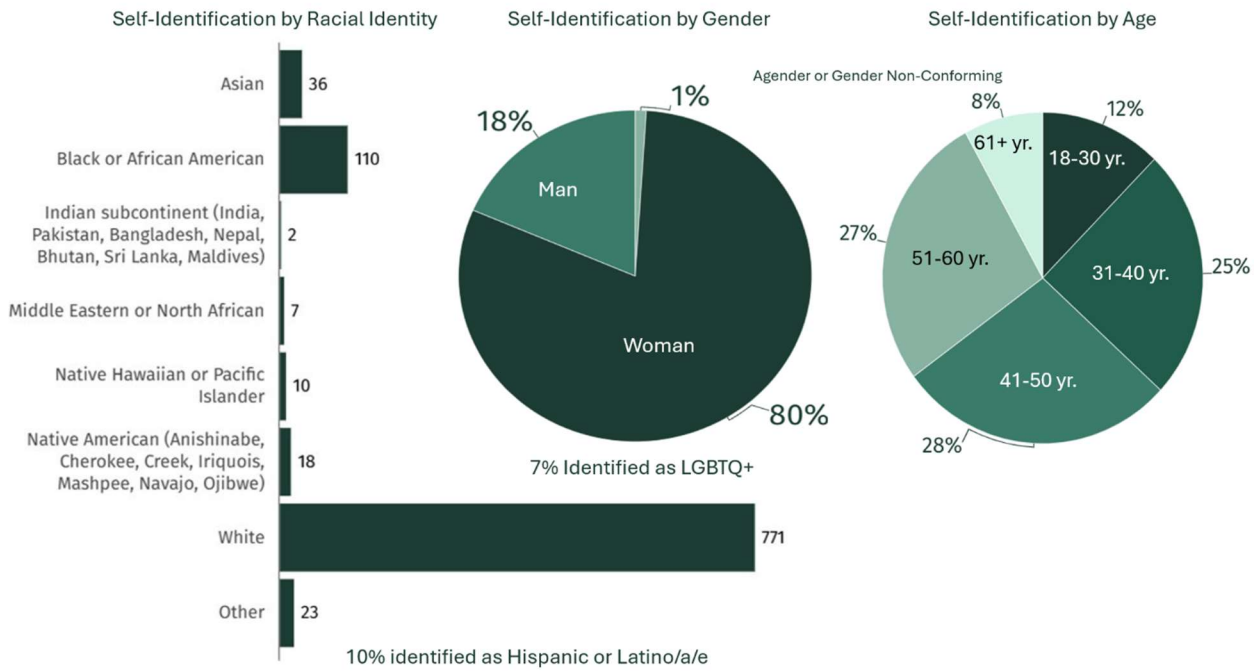
Biesta et al.'s framework is ecological in the sense that policies and resources can impact one's sense of agency. To further characterize this dimension of agency, we theorized that understanding the impact of elements in one's environment based social proximity might play a role in determining a sense of agency. Thus, we employed Bronfenbrenner's ecological systems model [2] and differentiated items between more proximal individuals (students, other teachers at the same school) and less proximal people or structures (school policy, administrators, communities) to test if the more proximal elements had a larger bearing on intentions to use AI tools.

Methods

Data Collection

We administered a survey to K-12 educators. The survey was administered January - May 2024. Participants were contacted via advertisements in teacher newsletters and via direct email. Participants were compensated $20 at survey completion. A total of 1,000 K-12 educators provided complete responses to the survey.

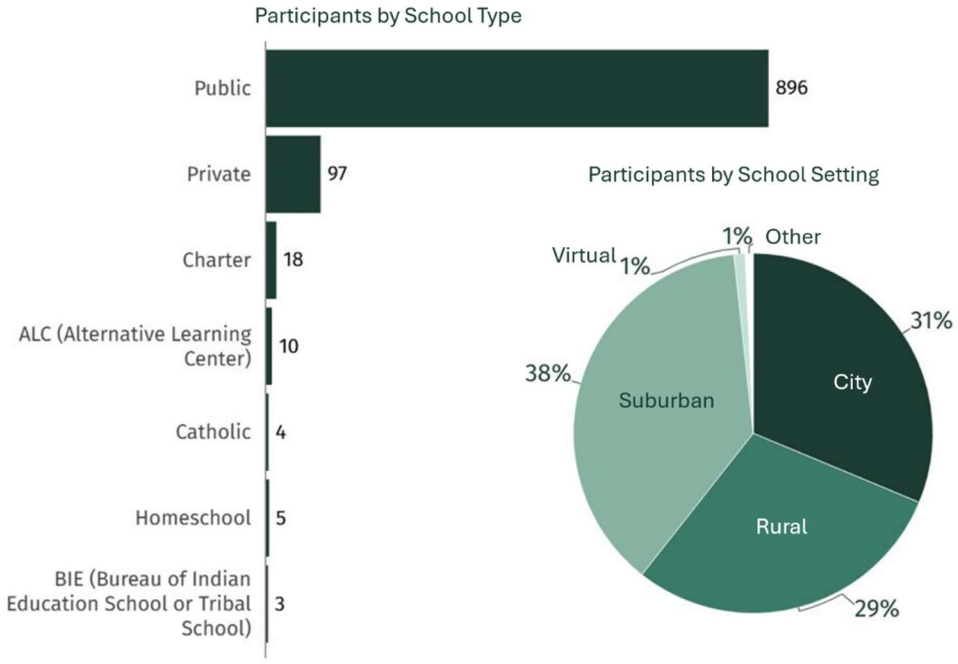
Figure 1. Participants by Sociocultural Identity



Participants

Nine teachers participated in cognitive interview testing and refinement of the survey instrument we developed. Survey participants were 1,000 adult teachers in the United States, with 51 U.S. states or territories represented in the sample. The survey sample was socioculturally (Figure 1) and educationally (Figure 2) diverse.

Figure 2. Participants by Educational Setting



Measures

The survey consisted of 44 Likert-scale options, which were influenced by an existing ecological agency measure [3], and two frameworks – an ecological agency model [1] and an ecological systems theory [2]. The wording and relevance of these items were refined through cognitive interviews [4] with nine K-12 educators purposively sampled across a range of teaching levels, topic, and settings [5]. Additionally, we asked three open-response questions, and collected 14 demographic questions. All questions were refined during cognitive interviews.

Example questions from the survey (and parenthetically, their theoretical orientations) include:

- *I feel confident in my ability to learn to use new AI tools for my classroom. (Agency, present experiences; Bronfenbrenner, self)*

- *My students have access to the technology necessary to engage with new AI tools in school. (Agency, present material supports or barriers; Bronfenbrenner, proximal individuals - students)*
- *My school has explicitly supported me in using new AI tools in my classroom. (Agency – past social supports or barriers; Bronfenbrenner, more distal structures – school policies or leadership)*

Analyses

Data were analyzed using R (version 4.3.2). We calculated descriptive statistics and correlations for the developed items. We also tested linear regression models for the purpose of predicting intention to use AI tools, conducted a thematic analysis of the open-response data, and conducted comparative analyses of items across subpopulations within the sample. The results of these analyses will be presented in a forthcoming manuscript and will also be shared on our project website (https://sites.google.com/umich.edu/k12-teacher-ai/home), while preliminary trends from the descriptive and thematic analyses are reported here.

Results

Our results suggest that school policy and culture are important factors impacting teacher agency and intentions to use AI tools. For example, 90% of participants indicated that teachers at their school or setting required more support to learn about AI tools. Access to technology (ex. limited internet access or computer access) was another important issue. One teacher replied to an open response item suggesting that, "using AI could be another way that lower income students are discriminated against."

Many teachers indicated ethical concerns regarding AI tool use and concerns about learning outcomes for students. For example, 85% of teachers agreed with having ethical concerns with students using AI tools, though only 52% of participants had ethical concerns about teachers using AI tools.

Despite these factors that might limit teacher agency and intentions for AI use, our participants envisioned many ways by which AI tools could provide support. One set of items asked teachers to list their key challenges and evaluate if AI tools could support them in overcoming these challenges. For example, 78% of teachers agreed that they could envision an AI tool supporting them with a key challenge in their teaching practice. Both analyses of open responses and comparative analyses across the items suggested that elementary school teachers were less likely to perceive benefits to using AI tools for students compared with middle or high school teachers. Teachers described challenges such as lesson planning, grading, and differentiation between

students of different abilities, while suggesting AI tools were less likely to help with issues such as classroom behavior and behavioral management.

Discussion

Our preliminary results suggest that while teachers perceive potential benefits for using AI tools to facilitate student learning and to decrease teaching workloads, challenges exist in the form of ethical concerns, lack of proficiency with AI tools, and ability to access or learn to use these tools. Resolving these issues will require action by both educational administrators providing required resources and support and AI tool developers considering teachers' needs. We recommend that developers or researchers testing new technologies should aim to reduce the burden of learning and using AI tools for the first time, making tools which differentiate based on student ability – including for special education settings, and cater towards grade levels and subjects when developing and advertising tools.

Future work by our team will include analyses of open response data, and recommendations to AI tool developers. To build teacher trust in AI tools, we recommend that research evaluating the learning outcomes of students using AI tools should characterize the implicit biases of tools that are being used in both personal and educational settings.

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