rppl Research Partnership for Professional Learning

ANNENBERG BROWN UNIVERSITY

AI in Professional Learning:
Navigating Opportunities and Challenges for Educators

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Executive Summary

As artificial intelligence (AI) tools like ChatGPT spread across our society, policymakers and pundits are actively debating the implications for students and schools. These debates tend to focus on the use of AI in the classroom.

There has been far less attention to the ways that generative AI will change teachers' professional learning experiences and reflection opportunities. Yet these shifts are already happening. AI developers are building systems to monitor classroom conversations and to provide direct and immediate feedback to teachers. Professional learning (PL) provider organizations are broadening their support structures by experimenting with AI to scale up instructional coaching.

Our organization, the Research Partnership for Professional Learning (RPPL), is a coalition of PL practitioners, researchers, educators, and funders working together to build a better evidence base around the design of effective PL opportunities. We called upon our broader network to help us understand the emerging landscape of AI in the PL space. Our purpose is twofold: to examine the current use of AI in teacher PL and to better understand how stakeholders perceive its potential future role in enriching teacher learning experiences.

Through interviews with AI researchers, developers, PL providers, and district personnel, we observed a mix of enthusiasm and caution among stakeholders regarding AI's potential in PL. Our research suggests that teachers and district leaders are primarily concerned about expanding PL opportunities to strengthen teachers' use of the time-saving AI tools currently in circulation. On the other hand, AI developers and PL organizations are focused on the ways that AI could help to broaden the types of feedback available to a wider variety of teachers. Despite this divergence, the groups share concerns about equity, access, privacy, and data stewardship, underscoring the need for clear guidance from federal and state education agencies.

Leveraging these insights, we provide a series of recommendations that address stakeholder concerns with the goal of guiding future AI implementations in PL.

Specifically, we call for:

- A stronger **legal framework** from **policymakers** to better support district decisions on how to capture and use data about teaching for improvement purposes.
- More **structured opportunities and time** provided by **district leaders** and **PL provider organizations** to allow teachers and leaders to develop their AI literacy and build shared guidelines for use.
- Stronger collaborative opportunities between **PL developers and teacher users** and between **researchers and educators** to expand our knowledge base and to ensure that new innovations draw deeply on the expertise of those working across different school contexts.
- More **funding** prioritizing initiatives that promote equitable access and address barriers to AI adoption, fostering an inclusive and supportive ecosystem for AI-driven PL development.

Our purpose is to examine the current use of AI in teacher professional learning and to better understand how stakeholders perceive its potential future role in enriching teacher learning experiences.

THE STUDY

This study draws on interviews we conducted of individuals working at the intersection of AI and PL. We spoke with teachers, coaches, and instructional leaders across a series of district systems, with program leaders within several large-scale PL provider organizations, with technology developers building next-generation AI systems, and with researchers who are studying the impacts of technology on schools.

We did not attempt an exhaustive scan of the field. Instead, we identified a broad sample across the range of individuals who, in coming years, are likely to shape and to have their work shaped by the expansion of AI into the teacher learning space. We asked interview participants to tell us about their current work and the ways that generative AI is already affecting what they do, and then we asked them about what they hoped to see as the technology continues to develop.

AI continues to evolve faster than our forecasts. Even those working at the cutting edge of AI in education told us they have trouble keeping up with the newest technologies and the ways that these technologies are getting deployed by AI vendors. We mean for this report to serve as an initial snapshot of a quickly shifting landscape – and we as RPPL plan to continue to provide regular scans of our network to help keep tabs on the ways that PL providers engage in the AI space over time.

Methods

This study examines the current use of AI in teacher PL and how stakeholders perceive its potential future role in enriching teacher learning experiences. Through interviews with AI researchers, developers, PL providers, and district personnel we explored three primary research questions:

1. **How are organizations and districts currently using AI for teacher PL?**
2. **What potential future applications do stakeholders see for AI in teacher PL?**
3. **What are the key challenges stakeholders are facing with regard to AI in teacher PL?**

We began data collection in November 2023, speaking first with professionals working for universities, edtech companies, and PL service providers who were involved in the research and/or development of AI tools for teacher PL. To identify study participants, we leveraged the RPPL network, reaching out to network members to consider participation and/or recommend someone else. To be eligible to participate, interviewees were required to have direct involvement with AI-based initiatives that were being conducted in partnership with at least one school district. This ensured a line of sight into implementation on the ground.

In addition to gathering data from AI developers and researchers, we also sought to understand the perspectives of the educators and leaders on the ground in districts. We therefore asked each AI developer/researcher we spoke with to connect us with their district partners so that we could explore the alignment between non-district and district priorities.

Our final sample consisted of 13 interviews with AI developers and PL providers and 22 interviews with district leaders, instructional coaches, and mathematics teachers from nine school districts. Where possible, we interviewed district leaders, instructional coaches, and teachers from the same district to triangulate perspectives across stakeholders.

Participant Type	Number of Participants
Researchers	4
Developers	5
PL Professionals	6
District Leaders	7
Instructional Coaches	7
Teachers	8
TOTAL	**37**

Once interviews were completed and transcribed, we created a set of thematic codes that were applied across all interviews. The codes aligned with our research questions and allowed us to identify common trends to inform our findings.

FINDINGS

The intersection between AI and PL looks very different across stakeholder groups.

Front-line educators over the past year have been flooded with AI offerings designed to improve their efficiency in the classroom, including tools for generating lesson plans, for differentiating content, and for improving communication with students and parents.

Among this group, the primary concern is how to create the learning experiences and the broader support structures within schools that ensure safe, high-quality, and discerning use of the tools that already exist and those that will be developed in coming years. In this report, we refer to these types of PL as **"Professional Learning *about* AI."**

In contrast, the PL organization leaders and developers we spoke to see an unrealized potential for AI to drive a new kind of teacher learning. This **"Professional Learning *with* AI,"** which aims to directly shift teacher knowledge, is still in the early stages, but it brings its own set of advantages and challenges.

We begin by describing these two different use cases in more detail and then look across both types to highlight shared concerns from stakeholder groups and opportunities for leaders across groups to take action to make it more likely that the shifting landscape leads to stronger, more equitable teaching practice across schools and school systems.

FINDINGS PART 1:
Professional Learning about AI

Tech-savvy students of all ages have found their own uses for AI as new tools have become available, and educators face difficult questions about how and when to allow students to use AI in the classroom. In our interviews with teachers and system leaders, we steered clear of debates about student application of AI and instead focused on teacher use.

The conversations with these interview participants tended toward a view of AI that emphasized its potential benefits in the realm of efficiency rather than learning or improvement. The teachers and system leaders that we spoke to had already felt the strong influence of AI through the rapid proliferation of tools aimed at improving efficiency.

Interview participants emphasized a series of ways that they or others in their buildings were using AI tools to reduce the burden of time-heavy tasks in their day. These included:

- Generating course content, including supplemental materials to facilitate student engagement,
- Differentiating and translating course materials to increase accessibility,
- Diagnosing student needs to support data-driven instructional decisions,
- Providing feedback on student work, and
- Communicating with parents and family members regarding campus events or individual student progress.

According to interview subjects, the use of AI tools is outpacing teachers' and leaders' understanding of how these tools actually work or how and when they are best deployed. Thus, while interview participants were often excited about the potential of AI to support instructional practice, they expressed a need for more specific PL that will teach them how to make sense of and best utilize the flood of AI tools entering classrooms.

Interview participants highlighted the need for two specific types of PL intended to support the effective use of AI to reduce teacher burden. The first type focuses on broadening general **AI literacy**. The second type enables teachers to practice **implementing AI tools,** piloting and making sense of the advantages and disadvantages of specific tools and use cases.

AI Literacy

Despite varying intensity of AI engagement within our sample, there was strong consensus across interview participants that teachers need stronger PL opportunities to understand AI more broadly.

While some districts have already allocated PL time to introduce teachers to AI, discussing its uses, limitations, and data implications, others are still in the early stages, with teachers expressing uncertainty about where to begin.[1]

1 Digital Promise offers a useful framework for AI literacy to support district knowledge-building about AI. Several universities have also started offering certificate programs for teachers and leaders on AI in schools.

In both types of districts – those that were just beginning to think about utilizing AI technologies as well as districts that have already selected tools and begun implementation – we heard calls for more extensive PL sessions to broaden faculty and staff knowledge about the basics of AI.

Teachers in particular almost universally spoke of a need for guidance on "how to use it, when to use it, when not to use it, and how to be discerning about the content it creates."

As teachers practice with AI platforms, a common area of need identified by stakeholders was the development of prompts - the process of crafting and refining the instructions or questions given to an AI model by a user to elicit the desired responses or complete specific tasks. Direct instruction and practice in crafting effective prompts was elevated as critical in avoiding AI "hallucinations" or false facts. One district leader explained, "People will go to ChatGPT once, and they'll type something in and [get] lots of terrible answers. And then they never come back because they're never learning to [develop the prompt]."

In addition, district personnel noted a lack of transparency about the kinds of data collected via AI tools, how that data is being used, and the extent to which that data is private. With teachers engaging in ongoing analysis of student data to drive instructional practice, a lack of clarity about data privacy serves as a primary barrier to adoption of AI for instruction. Using PL time to discuss these types of questions and concerns results in identification of district priorities for data safety and problems of practice to address through AI. It also allows for a more participatory approach to developing PL for the selection and implementation of AI tools.

Some districts have gone much further than others to educate personnel on the promises and challenges of AI as a tool for teacher efficiency. We heard strong examples from several interview subjects about the ways that certain district leaders and PL providers are incorporating hands-on demonstrations and low-stakes introductory activities, such as creating recipes or planning a family vacation, to familiarize their teams with AI tools.

It's also worth noting that while all stakeholders agree on the need for additional PL opportunities, the specific nature and focus of this training can vary based on the level of familiarity and engagement with AI among personnel. Awareness of and access to such resources varied widely across interview participants, signaling a need for stakeholder collaboration to ensure a common baseline for AI literacy. Additionally, different stakeholders may have differing needs when it comes to the content of AI-related PL sessions. For example, teachers expressed greater interest in having time to understand how to use the tools, whereas district personnel outlined additional time spent on understanding whether the tools comply with district and state policies.

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AI Implementation

As with any technology initiative, once teachers are introduced to the technology itself, they need structured time to identify best practices for implementation and develop a plan for monitoring the impacts. We heard a clear call from interview subjects for more PL that offered teachers structured opportunities to practice with district-adopted tools, or that invited district stakeholders to pilot tools and share their experiences with colleagues at school- or district-based PL.

District leaders and PL providers emphasized the importance of using PL time to develop practical frameworks and guidelines for navigating across platforms and aligning output with grade- or content-specific curricular activities. Additionally, these stakeholders highlighted the need for 'equity audits' to assess whether AI tools promote biased or disparate recommendations for certain subpopulations. In response to this, some districts have designated PL time for focus groups of teachers and coaches to learn about AI, pilot and evaluate specific tools, and generate guiding principles, district frameworks, and lists of 'Dos and Don'ts'.

These focus groups then develop activities for district- or school-wide PL sessions to lay the foundation for broader AI implementation. Professional Learning Communities (PLCs) and teacher-coach teams can then develop action plans for including AI in their lesson and coaching cycles.

In addition to focus groups, district personnel identified similar participatory methods that support broader AI implementation. In the case study, "Incorporating AI in District PL Infrastructure," we explore how a forward-thinking district strategically integrated AI into its PL framework, prioritizing alignment, collaboration, and continuous learning to enhance educational experiences.

FINDINGS PART 2:
Professional Learning with AI

For the leaders of PL organizations and for the AI developers that we spoke with, the promise of AI for teachers had less to do with the possibility of saving teacher time and more to do with the ways that AI could potentially enhance teacher skill by offering new ways to understand what was most effective in the classroom.

These interview participants spoke about AI's use or potential use across several different functions within PL including coaching, large- and small-group PL, and individualized PL plans. Stakeholders excitedly discussed the possibility of AI helping to provide widespread, teacher-driven PL and the ways the new technology could help to **scale, differentiate,** and **augment** existing PL.

Scaling Professional Learning

Given the time and resource constraints currently faced by many districts, AI could provide scalable, cost-efficient PL that may otherwise be unavailable or unsustainable. As one developer noted, "For the first time, if a million teachers knocked on the door tomorrow, we could support them all, with these high quality and completely differentiated experiences. And that's a really exciting vision for the future. Of course, we always want as many experts in the room and on the ground [with] teachers, but there's always that gap. Instead, we could turn on more computers and support more teachers."

Current Uses

The most commonly referenced use of PL with AI was virtual coaching. AI offers a potential coaching solution for districts and schools, providing teachers with opportunities for flexible, optimized coaching experiences. This use is consistent with how district coaches saw potential for AI to help scale their coaching structures, particularly in the face of limited coaching capacity. In describing one such platform, a developer explained, "We built this user experience for a teacher to have an interactive relationship with a computer.... just like if the coach was sitting in your room."

Emerging Uses

Developers also discussed the possibility of chatbots in providing access to PLC experiences for teachers who may be the only member of their grade or department. Developers noted that if AI models are trained by grade- or content-alike teachers, then using these chatbots allows teachers to participate in virtual PLCs to co-design or co-plan lessons.

Developers and teachers also discussed the potential for AI to generate simulations to support teacher professional learning. Both groups saw the potential for AI-generated virtual classrooms as an avenue for teachers to practice classroom management techniques and AI-generated student work samples as guided opportunities for teachers to practice giving feedback or to calibrate rubrics.

Differentiating Professional Learning

While district-wide, large-group PL sessions are aligned with broader district priorities, district leaders and coaches noted the challenges in offering PL that is aligned with individual teacher needs. Leveraging AI to support coaches and teachers in designing and implementing PL plans is one way to address this challenge, allowing for more robust, individualized learning plans for teachers.

Current Uses

In districts using virtual coaching platforms, district coaches highlighted the convenience of teachers using AI-driven feedback from a virtual coach to prepare for subsequent person-to-person coaching conversations. In describing how virtual coaching optimizes in-person coaching conversations, one coach explained that when teachers have the chance to review a lesson and reflect in advance, the coach can have "more of a pointed conversation...that's where the real learning happens."

Emerging Uses

For those teachers previously rated "highly effective" in district evaluations, some districts plan to leverage virtual coaching's combination of reflective practice and differentiated learning by offering the option to use virtual coaching and reflection in lieu of formal evaluations. This not only personalizes the supports

provided based on teacher experience, but also eases pressure on coaches' schedules, allowing more directed time for those teachers who would most benefit from in-person coaching.

District leaders and developers also noted the potential for AI to "create a system of recommendations and development activities that are individualized [to the teacher's needs] in the same way we can do for student learning." By using teacher feedback, AI systems can build differentiated learning plans aligned with district priorities that allow teachers to move at their own pace and that provide targeted feedback.

Augmenting Professional Learning

District leaders, PL providers, and AI developers also noted the potential for AI to strengthen PL by providing additional points of entry and maximizing in-person time between teachers and coaches or facilitators.

Current Uses

For teachers who might be apprehensive about being observed, district leaders and instructional coaches noted the potential for virtual coaching to serve as a less intimidating entry point. Because virtual coaching allows teachers to film and review their own classes, it mitigates concerns about coaching as evaluative, allowing teachers to focus on building a reflective practice. One district leader noted, "Our coaches have really found value with this, because what this has done is help them reach teachers that were resistant to coaching before; this is a good first step."

Combining in-person and virtual coaching can help to preserve resources and maximize the time teachers and coaches spend together. By reviewing data teachers submit after virtual coaching sessions, coaches are able to more directly focus their efforts to initiate in-person coaching cycles based on teachers' identification of areas where they may want additional support. In districts where interview participants are currently using virtual coaching, teachers appreciated the flexibility of the platform which allows them to review and reflect on lessons before or after school or during planning periods, which is not always feasible with 1:1 coaching sessions. By using this time to prepare reflections and questions individually, teachers could focus their in-person time on more in depth exploration of specific teaching practices.

Emerging Uses

In the context of large group PL opportunities, like school- or district-level workshops, developers and district leaders noted the potential for AI to both personalize and optimize PL experiences. For curriculum-based PL, chatbots can support individual teachers in building content knowledge or identifying specific resources, allowing PL facilitators to focus on best practices for instruction. This combination of live instruction and AI support to answer teachers' questions maximizes the time PL facilitators can spend on more complex issues and problem solving.

In districts with robust PLC structures, virtual coaching and chatbots that promote reflective practice and planning can optimize in-person PLC time by allowing teachers to focus on activities like reviewing student work and co-planning.

CASE STUDY

Participatory Development of AI Tools

One edtech organization offered a detailed plan for building AI tools into practice in ways that prioritized and honored teacher feedback – with the aim of empowering teachers to leverage real-time data for instructional decision-making.

Recognizing the importance of aligning their efforts with district priorities, the edtech organization adopted a collaborative approach. As our interview subject noted, "When we partner with districts, we ask them what their priorities are, and we develop solutions to those via our platform." Acknowledging that school districts are often stretched thin and resistant to adopting new initiatives, the organization prioritized proposing solutions that complemented existing workstreams, ensuring seamless integration and minimizing additional burdens on educators.

In addition to grounding the work in district priorities, the edtech organization underscored the significance of establishing sustained relationships with districts in order to signal its commitment to equitable outcomes. They engaged in collaborative planning and professional development sessions with school leaders and fostered open dialogues about data security to demonstrate a genuine investment in the success and safety of students and the broader learning community. This partnership-driven approach was rooted in the belief that understanding and supporting district priorities and goals was paramount to the initiative's success.

In pursuit of excellence and informed by best practices, the organization leveraged its talent acquisition expertise to assemble a team of 50 math instructional specialists. These professionals were tasked with scoring anonymous student work, with the calibration of their evaluations serving as a cornerstone for the development of an automated product. This deliberate approach was driven by a desire to create a tool grounded in the expertise of math professionals, ensuring its relevance and effectiveness in real-world educational settings.

To facilitate teacher involvement the organization designed the role to be flexible and remote, appealing to teachers seeking additional opportunities or looking to deepen their understanding of AI. Prioritizing candidates with at least 3-4 years of math experience and a current classroom presence, the recruitment process was executed with intentionality and care. The organization sought not only to develop and enhance its products but also to provide a value-added experience for participants, fostering a sense of community and shared purpose.

Throughout the process maintaining open lines of communication with its district partners was a cornerstone of the organization's approach. Through consistent touchpoints and feedback loops, they sought to ensure that the tool was meaningful, valuable, and aligned with district needs. By remaining accessible and responsive, the organization demonstrated a commitment to continuous improvement, striving to create tools that effectively supported the priorities and goals of its educational partners.

In summary, this organization's collaborative and partnership-driven approach to developing an AI-powered instructional tool exemplifies a commitment to innovation, equity, and educator empowerment. By aligning its efforts with district priorities, leveraging expert insights, and fostering meaningful relationships, it is paving the way for a future where technology complements and enhances the teaching and learning experience, ultimately benefiting students, educators, and the broader educational community.

FINDINGS PART 3:
Challenges & Concerns

While interview subjects differed considerably on the uses they saw as central when they considered the intersection of AI and PL, they shared a very similar view of the primary concerns and key questions that educators, PL leaders, policymakers, and developers would need to take on for AI to be deployed in ways that lead to genuine and equitable classroom improvement.

Stakeholders Are Navigating an Ambiguous Legal Landscape

Concerns about the legal use of AI-supported tools in education are widespread and heightened by the lack of regulatory guidelines. AI researchers and developers worry about accessing representative data sources to mitigate algorithmic bias. PL organization leaders fear potential infringement on their intellectual property rights by AI software companies. District leaders express concerns about affording tool subscriptions while safeguarding data privacy rights. Teachers fear unauthorized access to their data and/or being non-compliant by using specific AI technologies.

Federal and state regulations and laws addressing data privacy with AI software are lacking, leaving districts navigating an uncertain landscape. In particular, educators need better guardrails outlining the dos and don'ts regarding AI tools and data practices involving teacher and student identifiable information. For example, virtual coaching presents data issues in terms of the teachers being recorded/observed, but also in terms of students being recorded in the context of the classroom. Without federal regulations and/or laws addressing these concerns district personnel are left to navigate an ambiguous environment with serious potential consequences. Correspondingly, stakeholders call for clarity around data privacy, informed consent, and equity promotion in AI products. Some districts hesitate to adopt AI tools until regulatory clarity emerges and vetted tools surface, viewing the current environment as the "wild, wild, west." Others are left wondering "What are some reasonable guidelines? [...] It's really hard to come up with guidelines for something that's emerging and changing so fast. Because you don't really know where the guardrails should be, because you don't know what the next generation is gonna be tomorrow, next week, or next month. So from a PL standpoint, we're just thinking more of exposure, getting people in there, just what is it in terms of how to use it."

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Districts Face Unique Barriers to Adoption

Stakeholders raised concerns about adopting and implementing AI tools, highlighting barriers such as limited resource access, financial limitations, and a lack of awareness regarding AI initiatives. Stakeholders predominantly pinpointed dedicated learning technology specialists and access to AI software as essential resources, which some districts have and others do not. Additionally, numerous district personnel expressed a lack of awareness about emerging trends or opportunities, citing both uncertainty about where to find relevant information and insufficient time to actively seek out such resources.

In addition to understanding the potential sources of inequity, it is crucial to understand that measuring equitable implementation of AI across districts requires understanding district contexts in terms of both technology and PL systems. We caution against assuming districts that utilize AI in PL less frequently are doing so due to inequitable access to necessary resources. In a district with a robust PL structure that includes consistent/regular touch-points throughout the year, adoption of AI may not be a priority. As one district leader noted, "If one district has teacher PD every week or every couple of weeks throughout the year, they may not need additional teacher support because there are regular touchpoints with colleagues to do that kind of reflection or planning. But, for districts that only have time for PL at the start and end of the school year, AI is one way to provide ongoing support for teacher development." This comment highlights the importance of having a holistic understanding of the role of AI tools within the broader PL infrastructure before making any normative statement about equitable access.

Finally, one district leader noted that "people are thinking about [AI tools] financially, but they might not also necessarily be thinking about it, in terms of the effectiveness and the uptake of the t raining." Thus, many districts are left wondering, how can partnerships facilitate the integration of new AI tools and software into existing PL structures?

Users Don't Know Which Tools to Select

Stakeholders are grappling with uncertainty when it comes to selecting AI tools that not only save time but also align with best-use policies. Both users and researchers highlight this concern, with one AI researcher stating that "[tech providers] often are not incentivized to provide real data or evidence backing their impact or their effectiveness, especially, not for these different groups." As the landscape of technology evolves rapidly, stakeholders are left questioning which tools will gain prominence and which might fade into obscurity. Additionally, there's skepticism among district personnel regarding the accuracy of AI tools. A teacher pointedly remarked, "If I can't trust the output, then it's faster for me to just [create the materials] myself." This sentiment reflects the dilemma faced by educators who must decide whether to rely on AI-generated content or produce materials independently. Complicating the decision-making process further is the choice between open and closed system AI tools. In a closed system, the AI uses proprietary data and is limited to specific tasks set by the developer. In contrast, an open system utilizes a wider range of data sources to continuously learn and adapt, enabling the AI's ability to perform a dynamic set of tasks. Stakeholders must weigh the pros and cons of these options to ensure adherence to best-use policies while taking into consideration possible constraints.

In addition to the concerns mentioned above, several stakeholders raised a critical challenge regarding the need to assess whether AI tools inadvertently promote biases. One AI developer expressed concern about the potential for AI tools to "track" students or teachers, stating, "[Tracking] is not a problem that we face right now, thankfully, and it's definitely one that we were very intentional about in the way that we're diagnosing work." The root of this concern stems from the possibility that the AI models the tools are built on may be trained on data that lack diversity and representation. If the data is unrepresentative or reflective of historical biases, the AI can perpetuate existing biases by learning and replicating the patterns present in the training data, a phenomenon more commonly known as "algorithmic bias." Districts and educators face the challenge of being vigilant in evaluating the fairness and equity of these tools to ensure they support an inclusive and equitable learning environment. Addressing biases in AI tools is not only an ethical imperative but also a significant challenge in fostering a learning environment that is fair and beneficial for all students and educators. However, most districts, besides a few very large well-resourced districts, lack the expertise to do this themselves, and instead will need to rely on the support of academics and nonprofit personnel to support this endeavor.

Personnel Are Time Constrained

At every stage of the process, from selecting AI tools to implementing them, time constraints emerge as a significant hurdle. District personnel face a relentless juggle of limited time and a multitude of responsibilities. Allocating time for educators to become familiar with AI tools and software proves challenging amidst their already demanding schedules. With numerous tasks vying for attention, the pressure mounts on education stakeholders to integrate new products without adequate time for exploration prior to adoption or during implementation. The overarching challenge lies in carving out dedicated time for guided exploration amid a landscape of competing priorities. Compounding this issue, PL structures are typically established at the start of the academic year. Finding opportunities to incorporate AI literacy or AI exploration within an already packed PL plan presents an additional obstacle.

As the landscape of technology evolves rapidly, stakeholders are left questioning which tools will gain prominence and which might fade into obscurity. Additionally, there's skepticism among district personnel regarding the accuracy of AI tools.

AI's Impact on Adult Learning and its Interactions with Other Types of PL is Understudied

AI tools can demonstrably be shown to reduce teacher burden via time saved. However there is a lingering question as to when and how AI can best support adult learning. This poses a pressing challenge because the body of evidence is missing, creating a greater sense of uncertainty regarding the utility of some AI PL products. A recurring perspective voiced by stakeholders representing various districts was the imperative to learn from past technology rollouts to ensure that new educational technology (edtech) solutions achieve their stated goals, particularly in improving learning outcomes. One interviewee summed it up when they said "[district leaders] need to be slow, thoughtful, and strategic, and ensure that the tool is supporting a fleshed out theory of change. If we take the lessons from 15 years ago, you don't just put the product in front of the user." So before we even think about integrating tools, we have to get

firm on the utility of those tools. As one AI researcher put it, "I want [AI developers] to learn about learning, so that you can design better situations and activities for your [users]."

While interview participants expressed broad excitement about the potential for AI tools to provide valuable support and efficiency, there was a consensus that AI cannot replace the human connection and expertise of educators. Interviewees highlighted the need to strike a balance between leveraging AI for its benefits and preserving the critical role of teachers and coaches in education. A district instructional coach highlighted that "the one thing that I'm a little bit nervous of is that being the only form of professional development that teachers are getting, because we know there's value in that practice piece, in that planning piece [...] that you just wouldn't get from an AI." They agreed that while AI can alleviate teacher burdens and facilitate preparation for coaching conversations, human relationships remain pivotal to robust teaching and learning.

"We are grappling with what do teachers need to know vs. what do they need to do for compliance. There is a human element that needs to be incorporated in the former aspect. AI can help with the latter component." Coaches specifically noted that coaching behaviors and emotions necessitate a human perspective, acknowledging that while a virtual coach can aid in crafting an objective or guiding reflection, more intricate planning and differentiation should be coach-guided.

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There was also broad consensus that AI cannot replace all district-provided PL. There was a concern among some interviewees that adopting an AI-driven PL platform could lead to reduced support for teachers if it becomes the sole option and is not balanced with human-led follow-up, or that the introduction of AI for teacher PL could lead to over-reliance on technology. One AI researcher warned, "You can easily get to the other extreme [of] over reliance on technology ... that is also an area that a district [should be] actively thinking about: how do we avoid over-reliance on technology, either from teachers or students." This has potential equity implications as well if AI becomes, as one researcher warned, a "shortcut that's used in place of experts in underserved communities."

CASE STUDY

Incorporating AI in District PL Infrastructure

Guided by its foundational principles and district priorities, one district sought to build AI into its existing PL framework in a manner that honored its commitment to alignment, affordability, accessibility, and educator-driven PL.

The Chief Academic Officer framed AI as a learning challenge rather than a daunting obstacle, fostering a culture of exploration and innovation within the district. Given the pervasive integration of technology throughout the instructional framework, upper leadership demonstrated a willingness to lean into and explore new technological advancements, positioning the district at the forefront of educational innovation.

District leaders recognized the rapid evolution and proliferation of AI technologies and correspondingly launched the development of AI guidelines with a focus on exposure and understanding, acknowledging that AI is a dynamic field that will continue to evolve. To support this work, the district co-constructed guidelines for AI use in collaboration with district teachers, school leaders, and district leadership. These working guidelines outlined guardrails related to privacy, data use, and the structuring of prompts without using personally identifiable information (PII).

With a well-established and robust PL system already in place, the district prioritized alignment with district priorities and finding ways to ensure that PL opportunities were both affordable and accessible for teachers. A significant portion of the professional learning offerings were developed internally, leveraging the expertise of teachers and teacher leaders who were deeply rooted in the district's instructional framework.

Throughout this work, the district prioritized fostering engagement and understanding among district stakeholders by utilizing focus groups and offering AI-related PL opportunities that gave teachers time to interact with AI tools both informally and formally. Informal opportunities included games, contests, and drop-in "office hours," while formal engagements comprised structured PL sessions and virtual coaching focused on effective AI use.

The district emphasized the importance of representation from all departments, ensuring that technical expertise was integrated into the policy development process. By employing coders within the technology department to collaborate with vendors, the district ensured that AI technologies met its policies and legal requirements. Furthermore, the district stakeholder we interviewed emphasized that they wanted to adopt a cautious and deliberate approach, emphasizing the importance of "taking it slow," challenging assumptions, and thoroughly understanding the implications before scaling AI initiatives.

In summary, this district's thoughtful and strategic approach to integrating AI within its PL framework exemplifies a commitment to alignment, collaboration, innovation, and continuous learning. By honoring its foundational principles, engaging stakeholders, co-constructing guidelines, and prioritizing thoughtful implementation, the district is paving the way for a future where AI complements and enhances educational experiences, ultimately benefiting educators, students, and the broader educational community.

IMPLICATIONS FOR STAKEHOLDERS

AI has the potential to transform the future of PL, but we are a long way from using it to genuinely improve learning opportunities for teachers and students.

What will it take to get there?

- **Policymakers,** through their engagement with education stakeholders and development of clear ethical guidelines, will need to alleviate concerns surrounding data privacy and algorithm transparency, fostering an environment of trust and clarity.
- **District leaders,** by dedicating structured time for AI literacy initiatives, aligning technology with PL infrastructure, and fostering collaborative partnerships, will need to mitigate time constraints, enhance decision-making, and promote sustainable, data-driven PL practices.
- **AI developers,** guided by principles of ethical AI design and a focus on grounded learning science, will need to address concerns about the impact, effectiveness, potential biases, and equitable access to AI tools, ensuring responsible innovation and support for teacher learning.
- **Researchers,** working in genuine research-practice-partnerships, will need to build an evidence base for effective and equitable implementation defined by a deeper understanding of the complementary roles of AI-driven PL tools, and teacher and coach expertise.
- **PL provider organizations,** through their facilitation of sustained partnerships, dissemination of best practices and learning, and strategic, thoughtful implementation, will need to offer valuable support, resources, and guidance to districts, promoting effective, equitable, and sustainable AI integration in PL.
- **Funders,** by prioritizing initiatives that promote equitable access, financial support, and collaborative research partnerships, will need to address barriers to AI adoption, fostering an inclusive and supportive ecosystem for AI-driven PL innovations.

In this envisioned future, the challenges and concerns surrounding AI use in teacher PL would be systematically addressed, paving the way for a more informed, inclusive, and effective approach to PL that leverages the benefits of AI while respecting the unique contributions and needs of educators. In the case study, "Participatory Development of AI tools," we delve into how an edtech organization collaborated with districts to develop an AI-powered instructional tool, prioritizing innovation, equity, and educator empowerment to enhance personalized, data-driven instruction.

Below, we turn these potential shifts into practical recommendations and next steps to foster the effective and safe integration of AI within PL environments. Organized by stakeholder groups, these recommendations stem from insights gleaned through interviews conducted with various stakeholders. While not exhaustive, the proposals encapsulate essential tasks and activities crucial for navigating the evolving landscape of AI in education.

State and Federal Policymakers

- **Develop Clear Guidelines**
  Establish a comprehensive framework addressing the legal use of AI-supported tools in education, with particular emphasis on data privacy, informed consent, and equity promotion. Ensure that these guidelines are developed via a participatory approach so that educator voices are incorporated. We see promise in collaborations like the from the EdSafe Alliance, which has built out draft documentation to support these efforts.

- **Regulate AI Tools and Data Practices**
  Outline dos and don'ts regarding AI tools and data practices involving teacher and student Personally Identifiable Information (PII), ensuring that any recommendations do not keep researchers and developers from using data within the systems to address algorithmic bias

- **Support Research**
  Allocate funding for research into the impact of AI on teacher learning to inform policy-making and regulation.

- **Promote Awareness**
  Educate districts on existing and upcoming regulations related to AI in education to reduce ambiguity and encourage adoption.

District Leaders

- **Develop District Policies Around AI**
  Prioritize the establishment of clear district policies and guidelines regarding the procurement, implementation, and use of AI technologies in educational settings. Consider utilizing the National Institute of Standards and Technology (NIST) risk management and privacy framework suggestions, and engage stakeholders—including educators, administrators, parents, and students—in the policy development process to ensure that the policies align with the needs and values of the school community.

- **Align Technology and PL Infrastructure**
  Conduct a needs assessment and align technology with PL infrastructure to support teacher learning. Consider using the Council of the Great City Schools "K-12 Generative AI Readiness Checklist" to support strategic planning.

- **Dedicate Time for AI Literacy**
  Allocate structured time for teachers and instructional coaches to explore AI technology and build AI literacy. To support this process, districts can identify and leverage tools like the Digital Promise's AI Literacy Framework, metaLAB at Harvard's AI Guide, or CIRCLS' ""Glossary of Artificial Intelligence Terms for Educators" to provide structured guidance and support in building AI literacy.

- **Beware of Misleading Claims**
  Be cautious of exaggerated or false claims by AI tool providers and consult with technology specialists during the selection and implementation process.

- **Take a Balanced Approach**
  Encourage a balanced approach that values the unique contributions of teachers while leveraging AI tools to enhance efficiency and effectiveness in teaching and learning.

- **Invest in Technology Leadership**
  Involve technology specialists in decision-making processes related to AI tool selection and implementation. Allocate resources for district personnel to acquire teaching and AI certifications from reputable sources such as Digital Promise or academic institutions.

- **Monitor Implementation**
  Regularly assess the impact and effectiveness of AI tools in teacher PL to make informed decisions.

AI Developers

- **Adhere to AI Bill of Rights**
  Incorporate AI Bill of Rights recommendations when developing AI tools to ensure ethical and responsible use. Furthermore, consider signing onto the Center for Integrative Research in Computing and Learning Sciences "AI in EdTech Vendor Pledge."

- **Ground Design in Learning Science**
  Design AI tools grounded in learning sciences and connected to a clear theory of change.

- **Customize Solutions**
  Collaboratively design AI tools with and alongside educators to address specific challenges faced by them and their districts, ensuring solutions are grounded in their needs rather than imposed upon them.

- **Promote Equitable Access**
  Implement initiatives to promote equitable access to AI tools, addressing financial barriers, increasing awareness, and providing support to districts with limited resources.

- **Implement Methods to Assess AI Biases**
  Learn more about the possibility that AI tools promote biases due to their training data and build knowledge about how "equity audits" can be effectively conducted to ensure fairness and equity in AI tools.

- **Support Research**
  Collaborate with educational institutions to conduct research on the effectiveness and utility of AI in PL.

- **Ensure Product Efficacy**
  Provide transparent and robust evidence of product efficacy in the AI tools market to address concerns from districts about the lack of information on effectiveness, similar to standards seen in curriculum materials.

AI Researchers

- **Develop Strategies for Balancing AI Benefits and Human Expertise**
  Examine critical questions about how AI can be leveraged for its benefits while preserving the critical role of teachers and coaches and a stronger understanding of what teachers need to know to function effectively in the AI space.

- **Create Solutions to Avoid Over-Reliance on AI-Driven PL Tools**
  Investigate the ways that AI tools can be designed to support rather than supplant PL, particularly in underserved communities, and identify strategies to ensure that AI tools are designed to support meaningful instructional improvement across the system.

- **Evaluate AI Tools' Impact on Adult Learning**
  Conduct comprehensive evaluations of AI-enabled professional learning tools to gauge their effectiveness and influence on teacher learning outcomes. Simultaneously, delve into how AI technology can optimize teacher learning processes by investigating the dynamics between AI, teaching methodologies, and adult learners.

- **Foster Participatory Research-Practice-Partnerships to Better Study AI**
  Establish research-practice partnerships with under-resourced districts to provide access to AI tools, technical assistance, and financial support.

PL Organizations

- **Facilitate Sustained Partnerships**
  Foster sustained participatory partnerships between districts, PL providers, developers, and researchers.

- **Offer Support and Resources**
  Provide districts and educational organizations with support and resources to develop strategic plans for integrating AI tools.

- **Start Small and Be Strategic**
  Adopt a slow, thoughtful, and strategic approach to AI implementation, ensuring that tools support a fleshed-out theory of change.

- **Consider IP and In-House Development**
  Explore in-house development of AI tools to maintain control over intellectual property, even if it requires a slower implementation process.

- **Promote AI as a Complement**
  Emphasize the role of AI as a complement to, not a replacement for, traditional PL methods.

- **Share Best Practices**
  Disseminate information about successful AI implementations and best practices across districts and the PL field more broadly to foster innovation and collaboration.

Funders

- **Promote Equitable Access**
  Implement initiatives to promote equitable access to AI tools, addressing financial barriers, increasing awareness, and providing support to districts with limited resources.

- **Support Research Partnerships**
  Fund research partnerships with under-resourced districts to facilitate access to AI tools, technical assistance, and financial support.

- **Encourage Collaboration**
  Foster collaboration between districts, AI developers, and researchers to ensure the development and implementation of effective and ethical AI tools.

- **Monitor Impact and Accountability**
  Require grantees to report on the impact and effectiveness of funded projects, ensuring accountability and informing future funding decisions.

WHAT'S NEXT FOR RPPL RESEARCH

RPPL has identified several critical research questions and areas of inquiry about the intersection of AI and PL that we will take up as an organization in coming years. We view these areas of inquiry as important extensions of RPPL's work to better understand what works in PL, what doesn't, and why.

We continue to see a need for better understanding of how products are being deployed across populations and contexts. As an organization, we plan to conduct regular scans on how RPPL's PL providers are integrating AI into their ongoing PL models.

Second, we are working with our network to ensure high-quality evaluation of ongoing AI tools with a focus on understanding when and how AI benefits adult learners and how these impacts vary across contexts. With this landscape information in place, we hope to launch a series of experiments to better understand the balance between leveraging AI for its benefits and preserving the critical role of facilitators and coaches in building the right set of learning opportunities. We aim to explore concerns about over-reliance on AI-driven PL platforms and the potential for these tools to supplant rather than support PL and to help our network learn how to use AI tools to ensure equitable access to quality education.

Finally, we will broaden our work with PL developers and other organizations to continue to assess the potential for AI tools to inadvertently promote biases due to the data they are trained on, highlighting the importance of conducting "equity audits" to evaluate the fairness and equity of these tools.

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