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Using Artificial Intelligence Tools in K–12 Classrooms

The release of such generative artificial intelligence (AI) tools as ChatGPT in 2022 was a major advancement in the field of AI (Tugend, 2023). Two burning questions for K–12 educators are to what extent new generative AI tools will change teaching and whether they will improve learning (Bailey, 2023; Jimenez, 2023; Prothero, 2023; Ta and West, 2023).

The answers to these questions are not yet clear and likely will not be for some time. But to learn firsthand from educators the ways in which AI is beginning to affect teaching and learning in K–12 public schools, we surveyed and interviewed educators across the United States. Specifically, we surveyed a nationally representative sample of 1,020 teachers using RAND’s American Teacher Panel (ATP) in fall 2023. We also surveyed a nationally representative sample of 231 public school districts in fall 2023, and we interviewed 11 leaders from these districts in December 2023 and

January 2024.¹ The districts we surveyed and the leaders we interviewed are members of the ASDP. The ASDP is a research partnership between RAND and the Center on Reinventing Public Education. (The panel also collaborates with several other education organizations, including the Council of the Great City Schools and Kitamba.)

We combine the perspectives of K–12 teachers and district leaders in this report to construct the most comprehensive picture to date of how educators are engaging with generative AI tools for teaching. Teachers reported how they actually use AI tools in their practices, and district leaders reported whether and how they are providing policies, guidance, and training on the use of AI tools.

KEY FINDINGS

- As of fall 2023, 18 percent of K–12 teachers reported using AI for teaching and another 15 percent have tried AI at least once.
- Middle and high school teachers and those who taught English language arts or social studies were more likely to be AI users.
- Among those teachers who use AI for teaching, most were using virtual learning platforms, adaptive learning systems, and chatbots on a weekly basis.
- The most common ways that teachers used AI tools were to adapt instructional content to fit the level of their students and to generate materials.
- By the end of the 2023–2024 school year, 60 percent of districts plan to have trained teachers about AI use. Urban districts were the least likely to deliver such training.
- In interviews, leaders described focusing more on increasing teachers’ AI use and less on crafting student use policy, primarily because they saw the potential for AI to make teachers’ jobs easier.

Using these survey and interview data, we investigated the following four research questions:

1. How prevalent is teachers' use of AI tools for their work?
2. What types of AI tools do teachers use and for what purposes?
3. What share of districts are training teachers or issuing guidance about generative AI?
4. To what extent are districts developing AI policies?

To answer these questions, we first investigated teachers' and districts' responses overall to our survey items. But, because educators' responses can vary depending on their school and district context, we also investigated different categories of teachers' and districts' survey responses. Namely, we examined differences by teacher characteristics (e.g., years of experience, subject taught, grades taught) and by school and district characteristics (e.g., school locale, poverty status, student racial and ethnic composition). Unless otherwise noted, we only call out subgroup differences in the text that are statistically significant at the $p < 0.05$ level. The full set of results from both surveys can be viewed and user-friendly charts can be created in Bento, a free data visualization tool. To learn more about Bento, go to www.getbento.info/about or email bento@kitamba.com.

Teachers' Use of AI for Teaching

In this section, we present results from six survey questions about AI use that we posed to 1,020 K–12 public school teachers located across the United States between October 11, 2023, and November 7, 2023. The teacher survey questions were preceded by the following definition of AI: “Artificial Intelligence (AI) tools and products can use data to detect patterns, automate tasks, and improve decisionmaking. There are many types of AI tools and products that are currently used to support classroom instruction, including chatbots (e.g., ChatGPT), adaptive learning systems (e.g., Khan Academy), and virtual assistants (e.g., Amazon Alexa). This section

Abbreviations

AI	artificial intelligence
ASDP	American School District Panel
ATP	American Teacher Panel
ELA	English language arts
K–12	kindergarten through grade 12
PD	professional development
STEM	science, technology, engineering, mathematics

asks you about the AI tools and products you use or may use in the future.”

Eighteen Percent of Teachers Reported Using AI Tools in Their Teaching and Another 15 Percent Have Tried Them

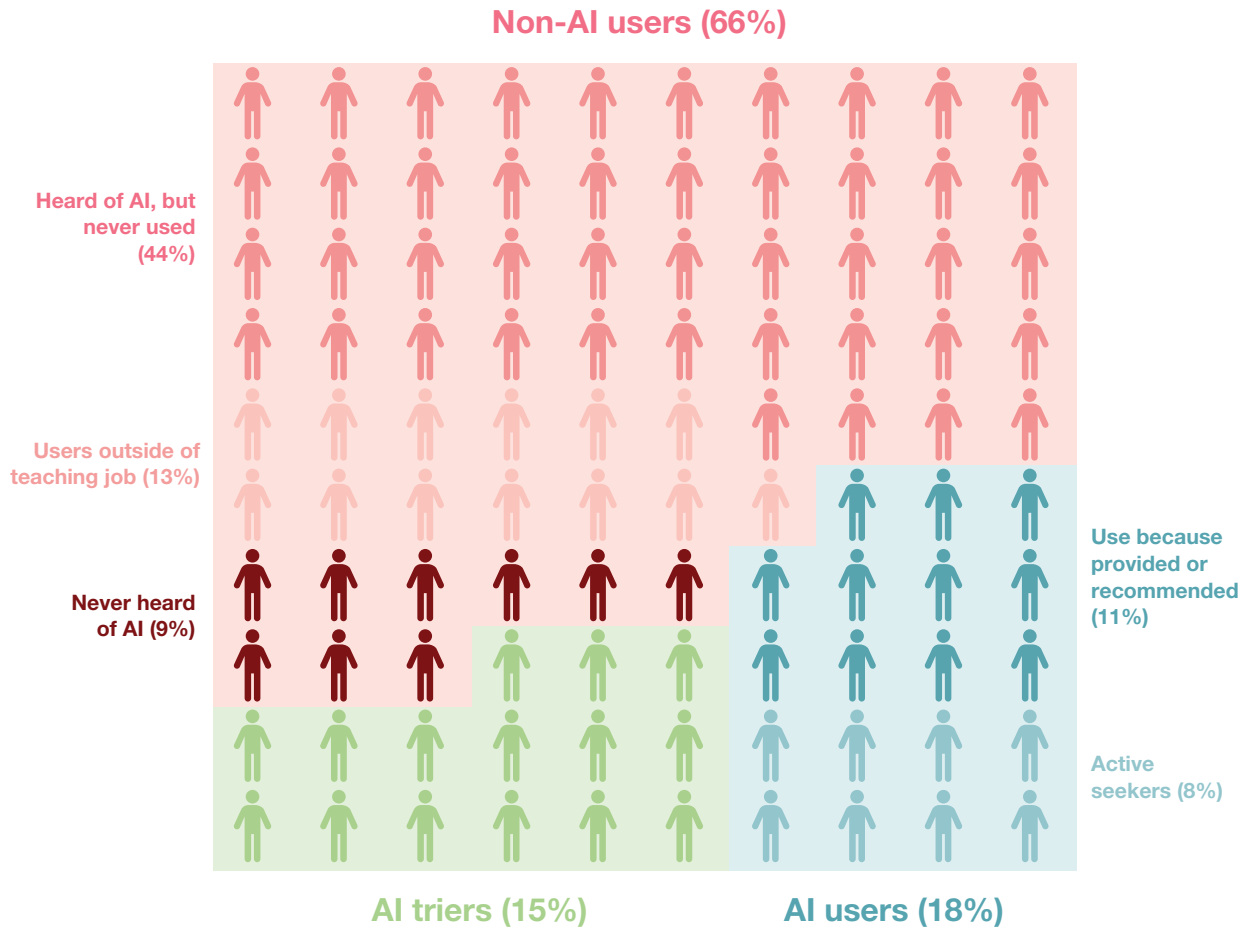
We asked teachers whether they used AI tools in their teaching, presenting response options that varied from “This is the first time I’ve heard about AI tools and products” to “I regularly use AI tools and products in my work as a teacher and actively seek out new AI tools and products to use myself.” We used this survey item to group teachers into three categories: AI users, AI triers, and non-AI users (see Figure 1).

The use of AI tools is still uncommon among teachers. We categorized only 18 percent of teachers as AI users. This 18 percent includes 11 percent who used AI tools and products in their work as a teacher because these products were provided or recommended by others (presumably by school system leaders or peer teachers). The remaining teachers reported actively seeking out new AI tools and products themselves. We categorized another 15 percent of teachers as AI triers. These teachers have tried using AI tools or products in their work as a teacher at least once but do not intend to regularly use them in their teaching.

Meanwhile, most teachers (66 percent) are non-AI users. This 66 percent includes 9 percent who have never heard of AI tools and products, 44 percent who have heard of AI tools and products but have never used them, and 13 percent who only use AI tools and products outside their teaching job.

FIGURE 1

Percentage of Teachers Who Reported Using AI Tools and Products in Their Teaching



NOTE: This figure depicts response data from the following survey question posed to teachers: “What best describes how you currently use AI tools and products in your work as a teacher during this school year (2023–24)?” (*n* = 1,002). Percentages do not sum to 100 because of rounding.

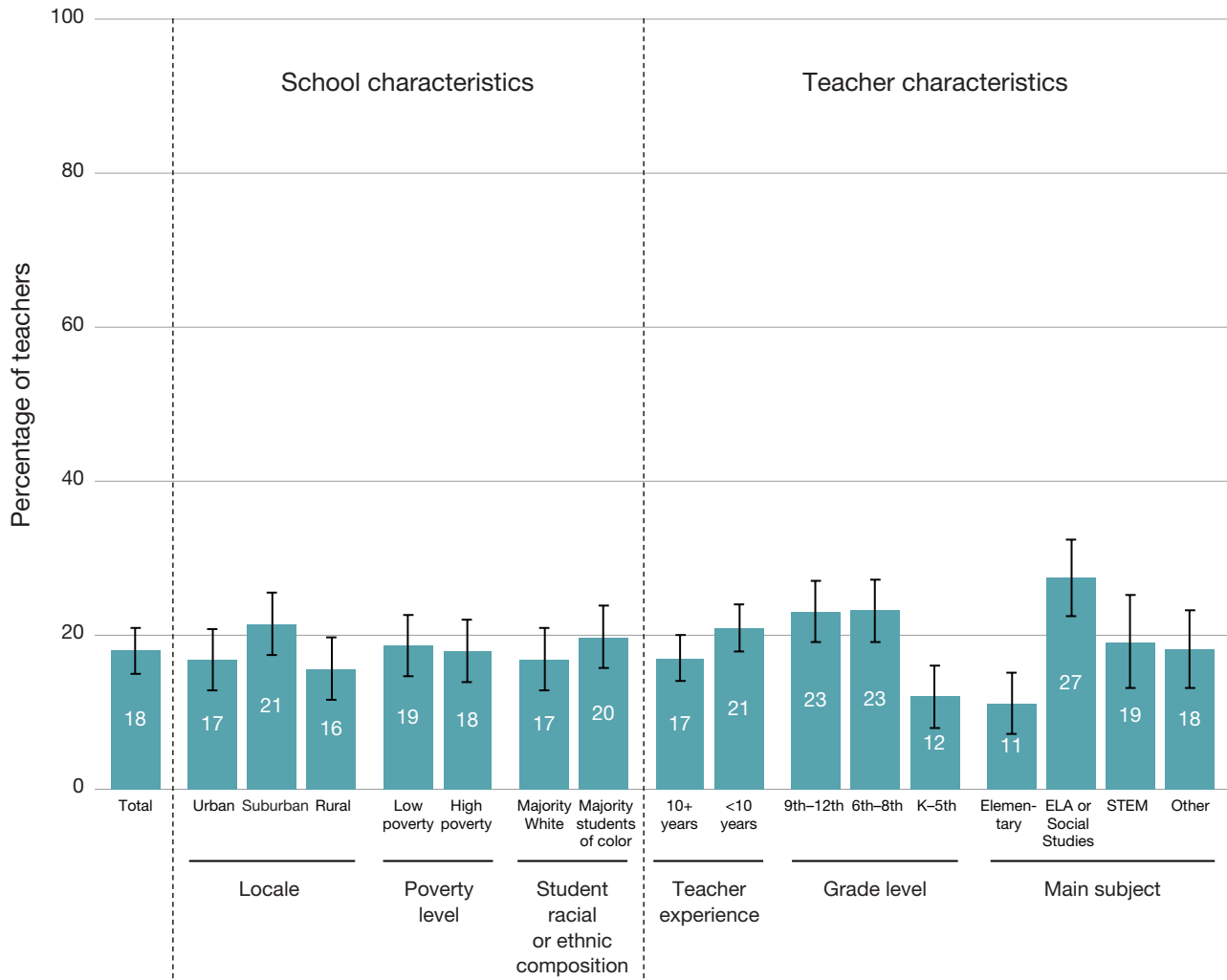
Middle and High School Teachers and Those Who Taught English Language Arts or Social Studies Were Most Likely to Use AI for Teaching

The share of teachers who were AI users varied by grade level and the subject those teachers taught (see Figure 2). For example, 27 percent of teachers whose main teaching assignment was English language arts (ELA) or social studies used AI tools or products in their work—a significantly higher share than those with other main teaching assignments, such as general elementary (11 percent) and science, technology, engineering, and mathematics (STEM) (19 percent).

We suspect that ELA and social studies teachers are the most likely to customize, supplement, or develop their own lessons and, thus, are the most likely to use AI for lesson ideas. In prior research, ELA teachers were significantly more likely than mathematics teachers to report primarily using self-created curriculum as opposed to off-the-shelf textbooks and instructional materials (Kaufman et al., 2020). Other RAND research has also found that the majority of social studies teachers cobble together instructional materials from various sources or make their own. This is possibly because those teachers receive less guidance from their school system about curriculum than the teachers of other core academic subjects do (Diliberti, Woo, and Kaufman, 2023).

FIGURE 2

Percentage of Teachers Who Are AI Users, by School and Teacher Characteristics



NOTE: This figure depicts response data from the following survey question posed to teachers: “What best describes how you currently use AI tools and products in your work as a teacher during this school year (2023–24)?” (n = 1,002). Includes respondents that we categorized as AI users. Black bars represent 95-percent confidence intervals.

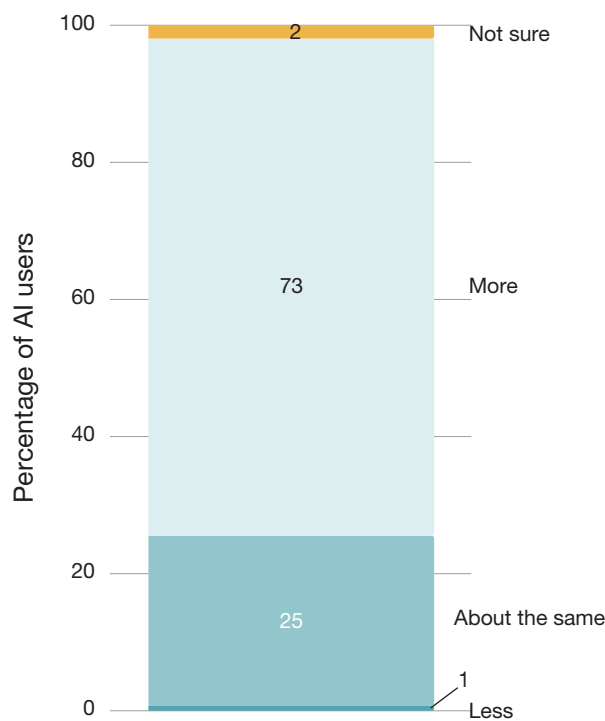
Extrapolating from these findings, we anticipate that teachers who generate their own content, for whatever age of student or subject, are the most likely to use AI for lesson plan development. This could have the effect of creating instruction that is not aligned to grade-level standards or schools’ planned sequences. Or, if prompted well, AI-generated modifications or wholesale lesson development could potentially be more aligned with grade-level standards, at least relative to the counterfactual of teachers pulling content from Pinterest, Teachers Pay Teachers, or other clearinghouses for lesson ideas.

Perhaps surprisingly, we did not observe significant differences in the share of teachers who reported being AI users by school characteristics or by years of experience (see Figure 2). For example, teachers in urban and rural settings were roughly equally likely to use AI tools and products in their teaching, as were teachers in low- versus high-poverty settings. We caution readers from interpreting this to mean that all teachers in these categories are equally likely to use AI (or not) because the total number of AI-using teachers was low, and, thus, these subgroups are small.

About Three-Quarters of AI Users Expected to Use AI Tools More in the Future

For those teachers that we categorized as AI users, we gathered more-detailed information about how they currently use AI and their expectations for the future.² Nearly three-quarters (73 percent) of current AI-using teachers said that they expect to use AI products and tools more next school year (2024–2025) than they do this school year (2023–2024) (see Figure 3). Another one-quarter (25 percent) of AI-using teachers expected to use these products

FIGURE 3
AI-Using Teachers’ Reported Expectations That the Use of AI Products and Tools in Teaching Will Be More, Less, or About the Same in 2024–2025 as in 2023–2024



NOTE: This figure depicts response data from the following survey question posed to teachers: “Think about how much you use AI products and tools thus far this school year (2023–24) in your work as a teacher. Do you expect to use AI products and tools in your work as a teacher more, less, or about the same during the next (2024–25) school year?” ($n = 178$). Includes respondents that we categorized as AI users.

and tools about the same amount in the future. Only 1 percent of AI-using teachers said that they expect to use the tools less in future school years than they do now.

In results not shown, 28 percent of teachers not currently using AI expected to use AI tools more in the future. Thus, we see evidence that both current AI users and nonusers alike foresee more rather than less use of AI tools for teaching in the future.

AI-Using Teachers Were Mainly Using Virtual Learning Platforms, Adaptive Learning Systems, and Chatbots

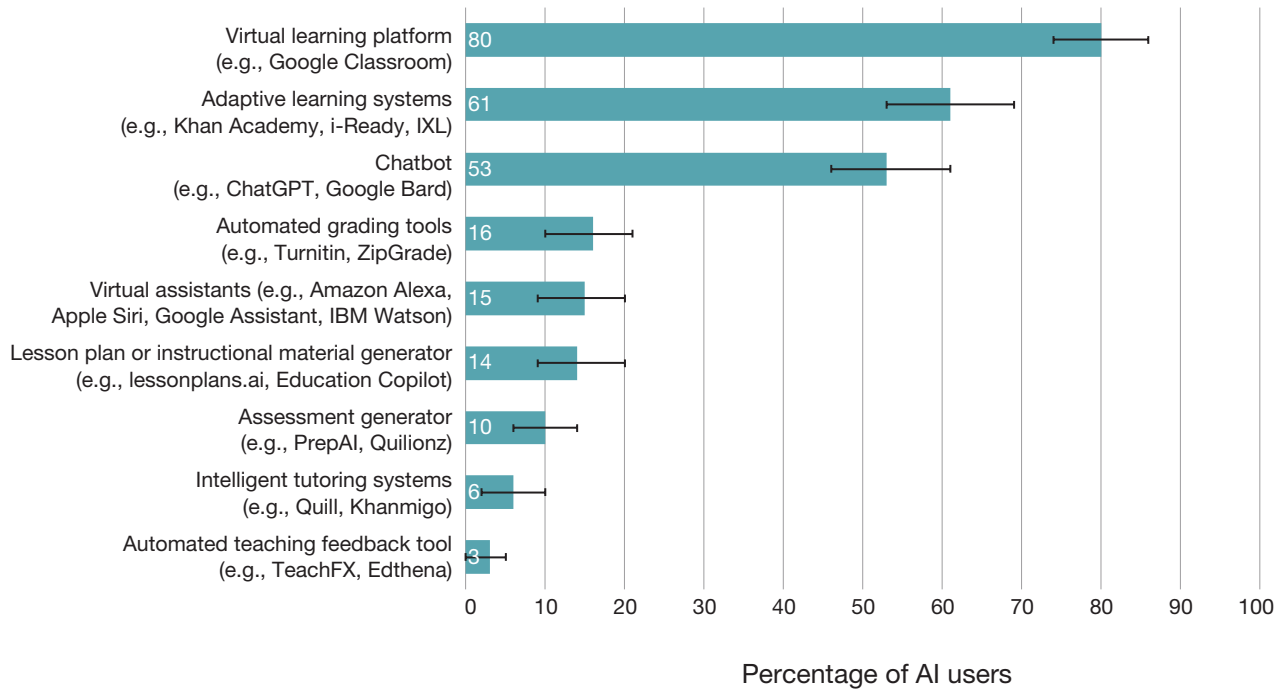
We asked current AI-using teachers about the specific products and tools they are using at least once per week. We presented AI users with a list of nine categories of AI products and tools and asked them to select which, if any, they used. Some of these tools were teacher-facing (e.g., lesson plan or assessment generators), some were student-facing (e.g., adaptive learning platforms, tutoring), and some were potentially both (e.g., ChatGPT).

AI-using teachers most commonly reported using virtual learning platforms (such as Google Classroom) and adaptive learning systems (such as Khan Academy) (see Figure 4).³ Majorities of AI-using teachers used these two categories of products or tools at least once per week: 80 percent used virtual learning platforms and 61 percent used adaptive learning systems. We believe that, of the nine categories we listed, virtual learning platforms and adaptive learning systems are the products or tools that schools or districts have purchased or adopted school-wide and then assigned to teachers to use. We view the other seven categories of tools we listed as more likely teacher-initiated and not school-assigned.

The third most popular category of AI tools among teachers who are current AI users was chatbots, such as ChatGPT or Google Bard (now Google Gemini). Fifty-three percent of AI-using teachers reported using chatbots. Unlike virtual learning platforms and adaptive learning systems, these chatbots are clearly part of the recent wave of AI tools and products and represent clear evidence of change to standard practice.

FIGURE 4

Among AI-Using Teachers, Percentage Who Used Various Types of AI Products and Tools at Least Once Per Week



NOTE: This figure depicts response data from the following survey question posed to teachers: “During this school year (2023–24), which of the following types of products or tools have you used at least once a week in your work as a teacher?” (*n* = 178). Additionally, 10 percent of teachers selected “Other,” and 1 percent of teachers selected “I have not used any of these types of products or tools.” Includes respondents that we categorized as AI users. Black bars represent 95-percent confidence intervals.

There is a steep drop off in usage beyond those three categories of AI tools (see Figure 4). Roughly 15 percent or fewer of AI-using teachers reported using tools that are specifically designed to help write lesson plans, write assessments, do grading, or provide teacher feedback at least once per week. This low usage likely reflects how new these products are for public use, as well as the ability for large language models, such as ChatGPT, to perform such teacher-specific tasks as lesson writing, potentially obviating the need for a teacher-specific tool.

We did not find that use of the types of AI products and tools shown in Figure 4 differed by teacher or school demographics (results not shown).

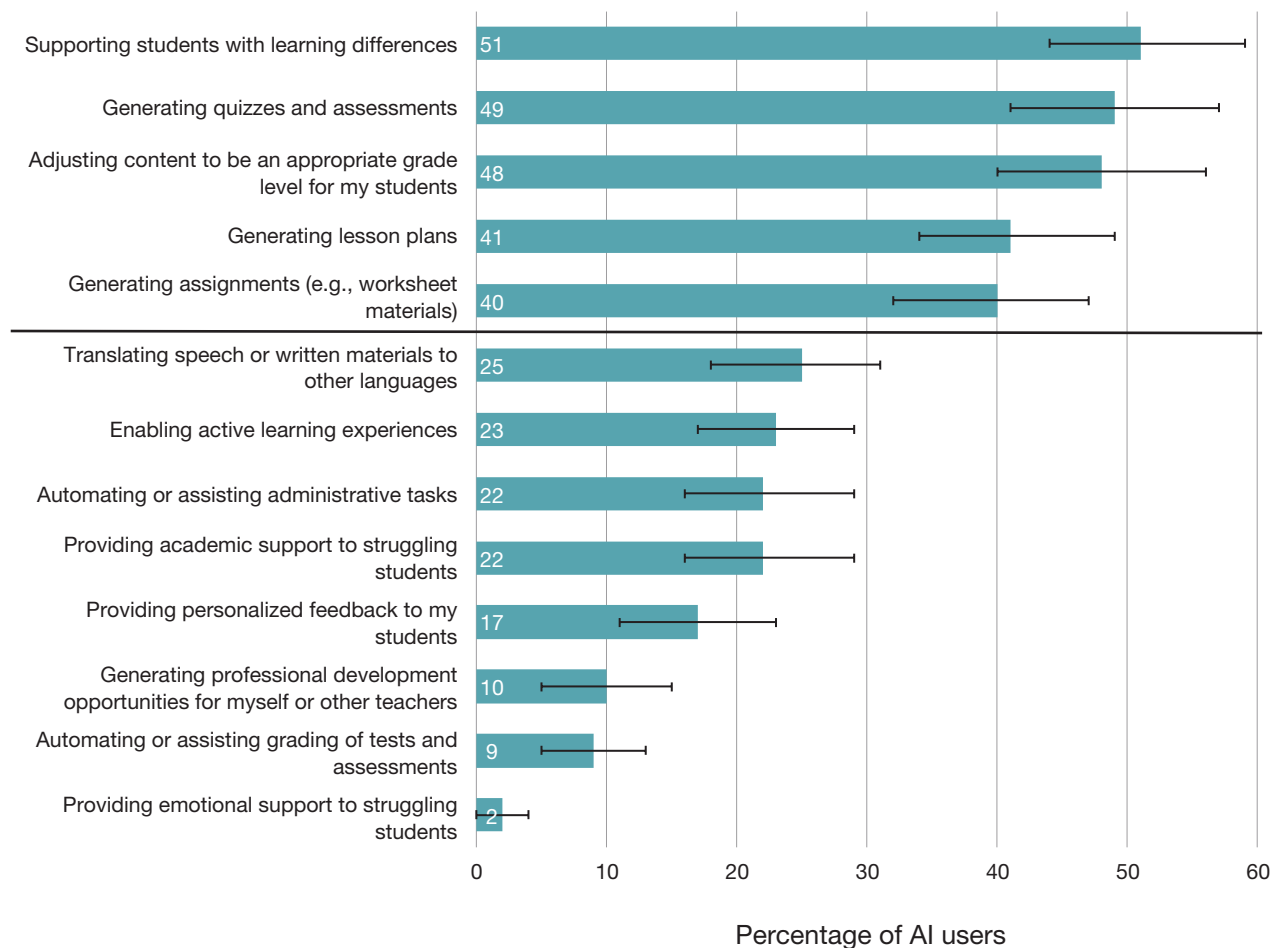
AI-Using Teachers Most Commonly Used AI Tools to Customize Instruction and to Generate Materials

Regardless of what specific AI tool(s) and product(s) they reported using, we asked teachers for what purposes they have used these tools. We listed 13 potential uses and asked teachers to select for which purposes, if any, they have employed AI. Although we note that some of the tools and products mentioned in Figure 4 might be more or less suited for some use cases than others, our sample size is too small to connect teachers’ use of specific tools to specific purposes.

We found that AI-using teachers most often used AI tools and products to adapt instruction and generate materials (see Figure 5). For example, 51 percent of AI-using teachers said that they used AI products and tools to support students with learning differences, and 48 percent said that they

FIGURE 5

Among AI-Using Teachers, Percentage Who Reported Using AI Products and Tools in Various Ways



NOTE: This figure depicts response data from the following survey question posed to teachers: “During this school year (2023–24), in what ways have you used AI products or tools?” (*n* = 178). Additionally, 3 percent of teachers selected “Other,” and 1 percent of teachers selected “I have not used AI products or tools in any of these ways.” Includes respondents that we categorized as AI users. Black bars represent 95 percent confidence intervals.

used AI to adjust content to make it at an appropriate grade level for their students. Meanwhile, 49 percent said that they use AI to generate assessments, 41 percent said that they use AI to generate lesson plans, and 40 percent said that they use AI to generate assignments. Some of the AI products and tools that teachers reported using most often—such things as adaptive learning systems and chatbots—would likely be appropriate for these purposes. Because so few teachers reported using tools that are specifically designed to generate lesson plans and assessments (as shown in Figure 4), we suspect that some, if not most, teachers used more general tools, such as

ChatGPT, for these purposes instead of tools specifically designed for these purposes.

Meanwhile, about 20 to 25 percent of AI-using teachers used AI products and tools in other ways too, such as to translate language (25 percent), enable active learning experiences (23 percent), support administrative tasks (22 percent), provide academic support for struggling students (22 percent), and provide personalized feedback to students (17 percent).

In results not shown, we gauged how uses of AI differed by teacher and school characteristics. Noting the small number of AI-using teachers, we were not surprised that we found only one statistically sig-

nificant difference: Teachers in high-poverty schools were significantly more likely to report using AI for “generating lesson plans” than their peers in low-poverty schools (49 versus 36 percent, respectively).

To learn more about how teachers use AI in their classrooms, we also asked AI triers and AI users the following question: “In a typical week during this school year (2023–24), describe how you use AI products and tools in your work as a teacher.” We received 329 open-ended responses from teachers. We summarize both the AI triers and AI users’ responses here, since our purpose is to illustrate all the ways teachers are thus far using AI, regardless of the frequency of that use. In their responses, teachers shared specific examples that vary from rote tasks, such as generating fill in the blank sentences for worksheets and drafting emails to parents or recommendation letters, up to proposing full lesson plans. Although lesson planning was among the most popular uses of AI (as shown in Figure 5), teachers’ open-ended responses suggested that they used these technologies as supplementary tools rather than for the wholesale creation of fully fledged lessons. For example, teachers who cited lesson planning in their responses mentioned using such tools as ChatGPT to identify “starting points for lesson plans” or “broad project or activity ideas that [they] would then [flesh] out.”

AI Users and Nonusers Alike Identified Similar Barriers to Future AI Use

Finally, we asked all teachers, regardless of whether they reported using AI tools in their teaching, to identify their top three barriers to expanding their use of AI tools in their work. We listed 11 potential barriers. In Figure 6, we display the percentage of teachers who identified the barrier as among their top three. To see whether AI users view barriers differently than other teachers, we report in Figure 6 both AI users’ views as well as those of all other teachers (including the non-AI users and the AI triers described in Figure 1). In our discussion here, we refer to these two categories as *AI users* and *nonusers*.

As shown in Figure 6, AI users and nonusers generally identified similar barriers to future AI

use. For example, both AI users and nonusers most often cited “concerns about the role of AI in society as a whole” as a barrier to future use (42 percent and 44 percent, respectively). Similarly, nonusers were equally as likely as AI users to report data privacy as a top barrier (both 36 percent).

There was one barrier on which AI users and nonusers diverged. That is, those who used AI tools were *more* likely than nonusers to indicate concerns about bias in these tools (35 versus 22 percent, respectively) as a top barrier to future use. We hypothesize that this is because AI users are more familiar with AI and possibly more versed in the potential ways bias could arise.

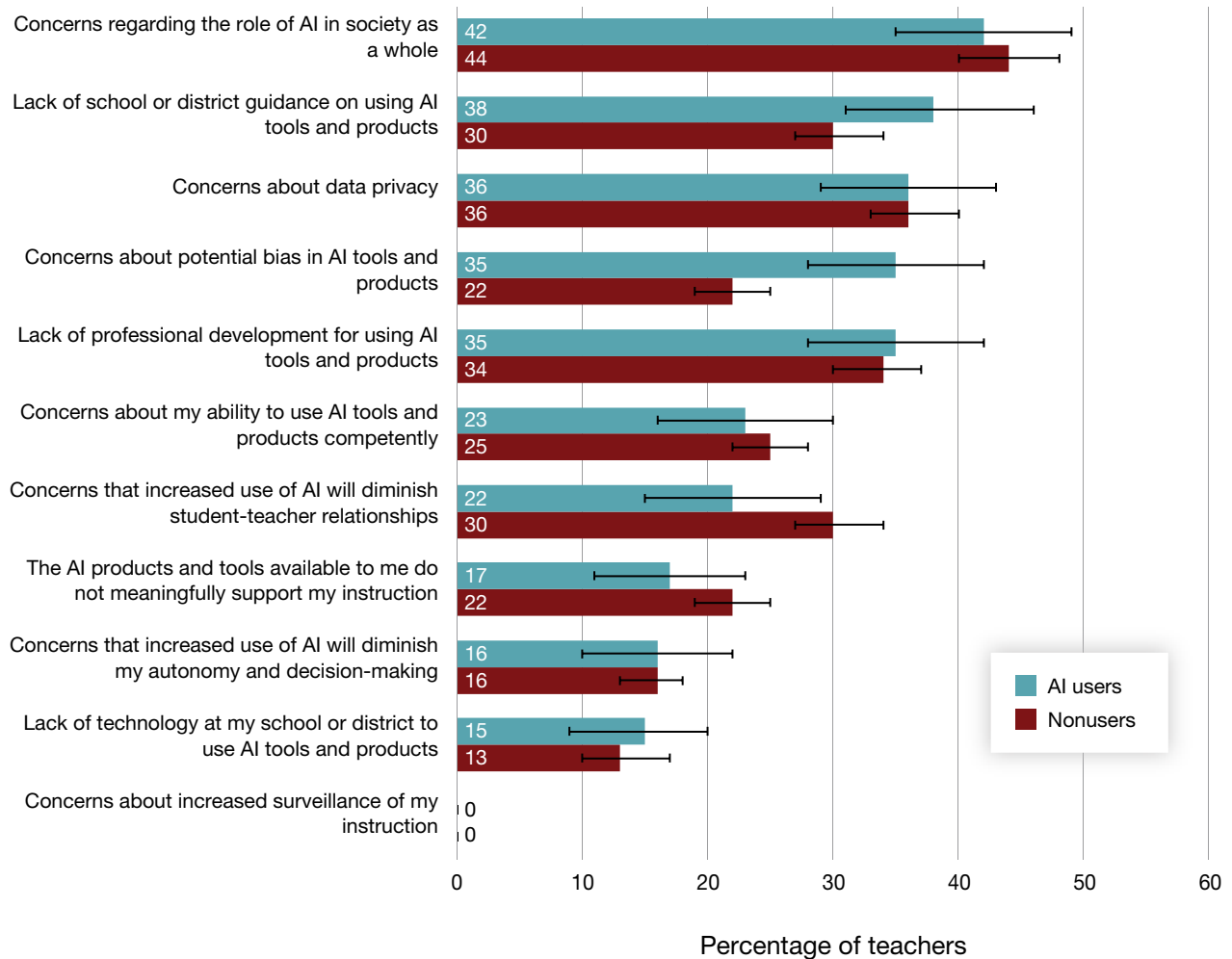
In results not shown, we also investigated teachers’ perceptions of barriers to future AI use by their own and their school’s characteristics. Although “lack of technology at my school or district to use AI products or tools” was the least frequently cited barrier among teachers, we did find that, among nonusers, teachers in high-poverty schools were significantly more likely to report this as a barrier (18 percent versus 13 percent, respectively). Among AI users, a higher share of those who worked in high-poverty schools identified a lack of professional development (PD) as a barrier compared with those who worked in low-poverty schools, although the difference is not statistically significantly different. By contrast, about equal proportions of non-AI users in high- versus low-poverty schools identified PD as a barrier to use. Furthermore, those teachers who viewed a lack of PD or district guidance as barriers to AI use were equally distributed across grade levels and school settings. Taken together, these patterns suggest that both current users and nonusers across K–12 will need professional learning supports and guidance from their districts or schools about the use of AI tools in the future.

Districts’ Supports for AI in Schools

As shown in Figure 6, about three to four out of every ten teachers cited “lack of school or district guidance on using AI tools and products” and a “lack of professional development for using AI tools

FIGURE 6

Percentage of Teachers Who Reported A Barrier to Future AI Use as Among Their Top Three, by Whether or Not They Are Current AI Users



NOTE: This figure depicts response data from the following survey question posed to teachers: “Which of the following do you consider to be the top 3 barriers to expanding your use of AI products and tools in your work as a teacher?” (n = 1,002). Each bar depicts the percentage of teachers who selected that barrier as among their top three. Additionally, 7 percent of teachers selected “Other.” Black bars represent 95-percent confidence intervals.

and products” as a top barrier to future use. To learn more about the policies, guidance, and training that districts are currently providing to their teachers, we surveyed a nationally representative sample of districts and conducted interviews with 11 district leaders. Our survey of 231 K–12 public school districts was administered between October 12, 2023, and December 14, 2023. One question on our survey asked leaders if they would be willing to participate in a short interview about their districts’ AI policies. We interviewed 11 district leaders who volunteered

to participate in an interview between December 2023 and January 2024. The interviewees were from small to mid-sized suburban or rural districts (and no large districts). Together, these survey and interview data shed light on the extent to which districts are providing guidance and addressing teachers’ needs for additional supports.

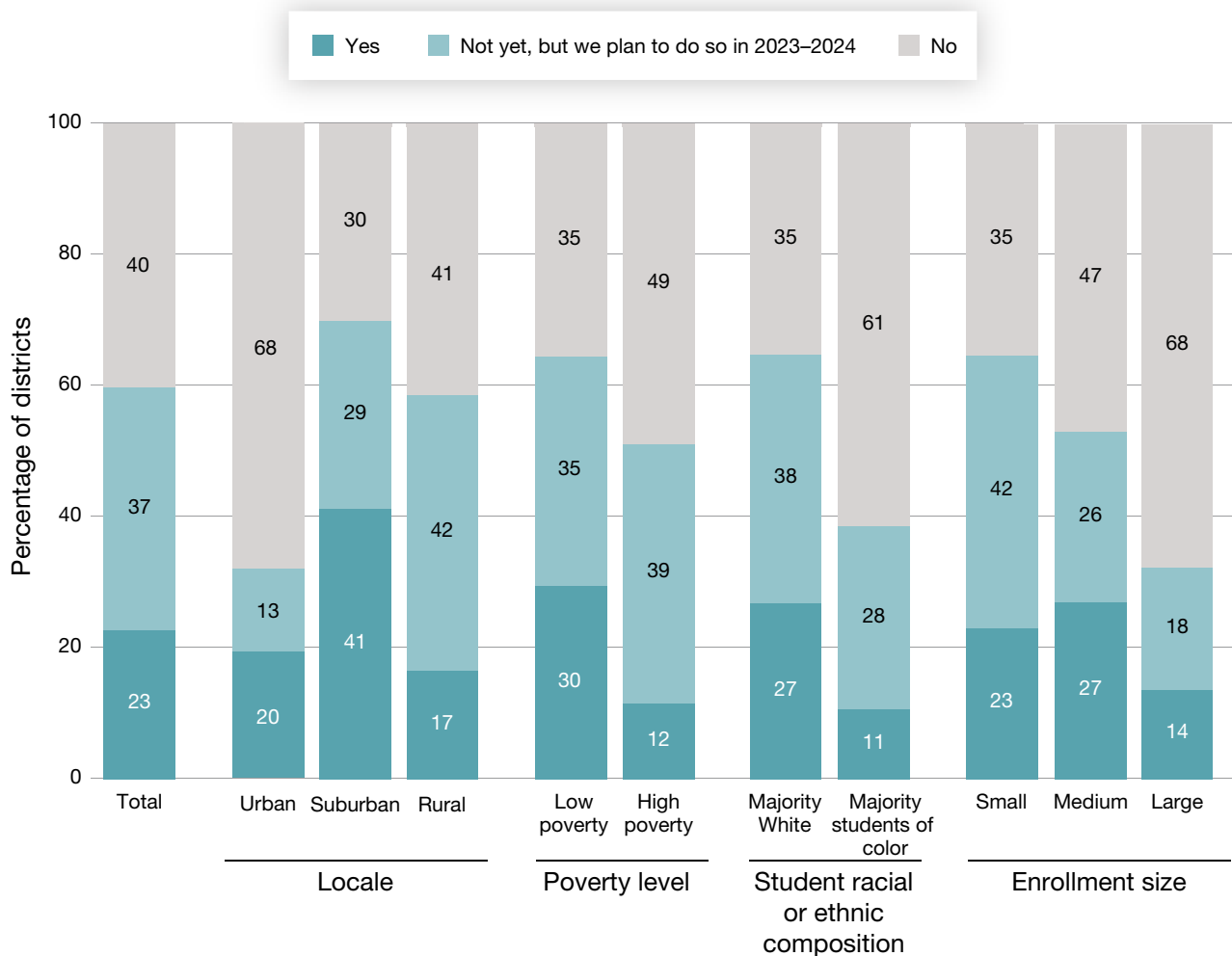
Historically Advantaged Districts Are the Most Likely to Have Already Provided or Plan to Provide Teacher Training About AI

According to reports from districts, only one-quarter (23 percent) had already provided training to teachers about the use of generative AI by fall 2023 (see Figure 7). However, a notable share of districts (37 percent) had plans to provide teacher training at some point during the 2023–2024 school year.

In total, 60 percent of districts planned to provide training to their teachers about AI by the end of the 2023–2024 school year.

However, we did observe some important differences by district characteristics. Already by fall 2023, greater shares of historically advantaged districts had provided training to their teachers about AI. For example, 27 percent of districts serving mostly White students had provided training on AI by fall 2023 compared with 11 percent of districts serving mostly students of color (a 16 percentage-point gap).

FIGURE 7
Percentage of Districts That Have Provided Training (or Have Plans to Provide Training) to Teachers About AI Use



NOTE: This figure depicts response data from the following survey question posed to districts: "Has your district provided training to your teachers about use of generative artificial intelligence (like ChatGPT)?" ($n = 224$). Bars may not sum to 100 percent because of rounding.

This training gap may only grow wider during the 2023–2024 school year. Assuming districts’ current plans come to pass, by the end of the 2023–2024 school year, 65 percent of majority-White districts will have provided training compared with only 39 percent of districts serving mostly students of color (a 26 percentage-point gap). We also observed this pattern by district locale. Only 32 percent of urban districts planned to provide teachers with training on AI by the end of the 2023–2024 school year compared with 59 percent of rural districts and 70 suburban districts.

Only 5 Percent of Districts Have Already Adopted AI-Specific Policies for Students, but Another 31 Percent Said They Are Developing One

We asked districts whether they had adopted a policy specifically about *students’* use of generative AI, such as ChatGPT. As of fall 2023, only 5 percent had adopted a policy specifically about students’ use of generative AI (results not shown). This is consistent with the 90 percent of teachers who indicated on our teacher survey that their school district did *not* have policies outlining students’ use of AI products and tools (results not shown).

Despite the fact that few districts already have a policy, another 31 percent indicated that they are working to develop such a policy. Although differences are not statistically significant, we observed a general pattern of greater shares of historically advantaged districts having plans to adopt a policy on students’ use of AI. For example, 40 percent of suburban districts said that they are working on an AI policy specifically on students’ use of AI compared with 34 percent of urban districts and 27 percent of rural districts.

Meanwhile, 17 percent of districts said no policy was needed because AI was already covered by their district’s acceptable use policy. The remaining 47 percent of districts had not yet developed a policy about students’ use of AI and had no plans to do so.

District Interviewees Were Primarily Concerned with Increasing Teachers’ Take-Up of AI Rather Than Limiting Its Use

To better understand districts’ AI policymaking, we conducted interviews with 11 school district leaders. We talked to six leaders who were in the process of developing a policy on generative AI for their districts. Among these leaders, none were working on policies that would outright ban students’ or teachers’ use of AI. These interviewees were more focused on how to use AI well rather than on how to restrict or block its use. One leader of a mid-sized district talked about working on policies that set “bright lines that shouldn’t be crossed but allows for usage and encourages usage within some space.” These leaders also found it difficult to write a policy that would enable the use of AI. In the words of one leader of a small district, “Policies almost always avoid the question of how to create the best learning environment. That is a better question, but you won’t find it in a policy.” Another leader of a mid-sized district described how “we’re stuck on the wordsmithing because you want the policy to be as general as possible but speak to a variety of situations that could occur.”

District Interviewees Were More Focused on Training Teachers to Use AI Rather Than Setting Policy About Student Use of AI

Mirroring the finding that few districts have put in place AI-specific policies, nine of 11 leaders with whom we spoke reported putting more of their time and attention into supporting *teachers’* understanding and use of generative AI tools and less attention into crafting policies around *students’* use of AI. As one leader in a small district said, “Instead of focusing on what the kids are using it for, how can *we* utilize it?” [emphasis in original]. In most cases, that was because they saw the potential in the technology.

Four leaders in small to mid-sized districts had already offered training to their teachers. These leaders reported that they relied on teachers or coaches with a personal interest in AI to lead these trainings,

which were relatively informal. As one leader in a small district described, “I have some internal folks who have really done their homework. They are my instructional tech coaches. They are really out there learning. They’re going to different conferences, local and national, and then bringing back information, playing with things, and then basically taking what they’ve learned and then disseminating it to the teachers in our school district.”

Leaders described seeing AI as having the potential to make teachers jobs’ easier and to support personalized instruction and special education. As one leader of a small, rural district said, “It can be a great time saver for teachers to help generate activities, lesson plans, documentation, artwork for various things. . . . I think for teachers, it will be a giant time saver once they learn how to use it and make sure that it’s useful and use it wisely.” Another leader in a small district hoped that as teachers used the technology, they would “see the benefit of how it can make their life more efficient.” This sentiment carried across leaders in mid-sized districts down to very small districts; all of them saw generative AI as a potential way to fill resource and capacity gaps. Some ways to use AI noted by the leaders included creating “baseline” or “emergency” lesson plans, worksheets, assessments, scoring rubrics, differentiating lessons, or creating rough draft learning plans.

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District Interviewees Voiced Concerns About Uneven Teacher Take-Up, Even With Training

The leaders with whom we spoke also worried about uneven teacher take-up of AI, even with training. One leader in a mid-sized district said, “My personal concerns are that it will not be operationalized evenly in classrooms. It’s just like curriculum. It’s hard to get curriculum consistency, and it will be the same with AI.” Another leader in a small district similarly remarked, “I’m more concerned that there’s a fear of it and not embracing it. This is something that if you don’t embrace, you’re just going to be doing extra work.”

Three leaders talked about how they had been working to set a vision about how AI could support improved teaching and learning. One of these leaders in a small district described how teachers’ opinions evolved:

I really talked about the potential power of this and how it’s going to happen regardless; our kids are going to be using it. It could be such a powerful tool for our teachers and we need to embrace it. And the principals . . . really understood at that point, the importance. So now we are, I’ve got a few people who are really trying to offer some PD for our teachers.

Rapidly Evolving AI and Navigating Downsides Is Slowing District Leaders From Setting Policy

Leaders also wondered about the utility of a policy in a rapidly evolving field that has still-emerging downsides. The nature of the AI space confounded several leaders and left them wondering how to develop a policy for, in the words of one leader in a mid-sized district, “something that is sort of eternally redefining itself.” All the leaders we talked to raised concerns that AI would need to be managed and that policy would be of little help in doing this, with the exception of preventing plagiarism and cheating.

The potential downsides that leaders mentioned would be difficult to manage with policy alone included ensuring student data and work remained

private, educating staff and students about potential problems with validity in AI (i.e., when models “hallucinate” facts that are not true), ensuring equitable access, and mitigating costs associated with per-student fees and professional development and training to ensure teachers are up to speed. Leaders of both historically advantaged and very rural and under-resourced districts shared concerns regarding the equitable access of students to AI and the potential for ballooning costs, both for the products and for the training. (We did not ask about the extent to which their decisionmaking had been constrained by resources thus far.)

District Interviewees Want Additional Guidance on Policy and Training

All the district leaders we talked with bemoaned the general lack of guidance around AI policy and training, both for themselves and their teachers. Leaders wanted to see model policy text and best practices to support student safety and data privacy or third parties that vet applications and programs for safety and reliability. On the training side, several leaders talked about vendors that are available to provide training on their specific AI-enabled product. However, none of the leaders with whom we spoke reported knowing of available training for teachers on how to use AI to enhance teaching and learning. Leaders also reported that webinars were not useful because most people had too little understanding of AI to access the shared information; the resulting dialogue was not “as deep as it could be.” Another leader in a small district shared, “I don’t know if anybody [on staff] has enough of the knowledge level to effectively share on something more than a basic level. . . . Or you’re the geek who understands it all, but as soon as you start to have the conversation, you’ve lost everybody in the room.”

For help, the leaders with whom we spoke were turning to their personal networks, since they had yet to receive guidance or support from state departments of education or state and national professional organizations.

Some Districts Are Already Piloting AI-Enabled Programs

Finally, four leaders with whom we spoke mentioned pilot programs or collaborations, further indicating how interested some superintendents are in experimenting with AI-enabled technology. For example, one district asked teachers to identify “essential questions” for each content area and grade level and then used AI to examine the extent to which their current curriculum matches what students need to learn to answer the essential questions. Another district has a subset of coaches developing training around using AI to differentiate instruction that they will then use in their work mentoring new teachers. Three districts have partnerships with tutoring programs or learning software that leverage AI to support student learning.

Discussion and Implications

Our surveys and interviews with more than 1,000 educators conducted in fall 2023 and winter 2024 revealed four key takeaways about how new AI tools will change teaching and learning in K–12 public schools.

First, although AI use is currently limited to a minority of teachers, it appears poised to grow. As of fall 2023, 18 percent of teachers were using AI-powered tools in their work as a teacher and another 15 percent had at least tried using AI tools in their teaching. This is evidence that AI tools already have an early foothold in schools, especially since the tools they are using tend to be ones procured by schools (e.g., adaptive learning systems) rather than ones teachers might find on their own (e.g., a chatbot). Among those teachers who used AI tools and products in the 2023–2024 school year, one-quarter plan to use these tools the same amount next school year, and the remaining three-quarters plan to use these tools *more* in their work in the future. Furthermore, one-quarter of those teachers who are not currently using AI said that they expect to use these tools more in 2024–2025. Thus, both current users and nonusers foresee more use of AI tools for teaching in the future, with some current nonusers poised to become adopters.

One reason that perhaps helps explain why teachers expect their AI use to continue to grow in

the future is that—contrary to some media reports (e.g., Singer, 2023)—many, if not most, districts are supporting teachers in navigating the integration of AI into teaching and learning instead of banning it outright. Twenty-three percent of districts had already provided training on AI, and another 37 percent intend to provide training at some point during the 2023–2024 school year. Furthermore, the district leaders we interviewed were more focused on how to support teachers in using AI to make their jobs easier than on how to block its use among students or staff. Some said that they were already piloting programs or software to support teaching. Although districts were further ahead on training than on crafting policies around AI use, the districts we surveyed and interviewed appeared generally supportive of the further integration of AI into schooling.

Second, customization of existing content is the leading way in which teachers are using AI in this work, which raises concerns about the quality of AI-generated content. More teachers reported using AI for the modification of instructional materials than for the other purposes we asked about on the survey. As of fall 2023, 51 percent of AI-using teachers said that they used AI products to support students with learning differences, and 48 percent said that they used AI to adjust content to make it at an appropriate grade level for their students. This confirms other reporting indicating that personalization may be the leading edge for AI’s impact on instruction (Tugend, 2023).

Further research on the quality of AI-generated classroom content is an essential next step in verifying its use in classroom settings.

Teachers who taught ELA or social studies were more likely to report using AI in their work than teachers who taught mathematics or science or who were general elementary teachers. As described above, we believe this is further evidence that one of the primary uses of AI tools and products for teachers is the ability to modify or customize instructional content. We know from prior RAND research (e.g., Diliberti, Woo, and Kaufman, 2023; Kaufman et al., 2020) that teachers of these subjects are particularly likely to be using self-created instructional materials or cobbling together materials from many sources rather than relying on published curricula.

Teachers’ reliance on AI tools to modify instructional content raises concerns about the quality of these creations or modifications. The incorporation of AI-generated content into instruction might improve the quality of the content being delivered (for example, it might bring in new voices or sources that teachers were previously unaware of), or it might reduce quality. Our survey does provide some fodder for quality concerns. In teachers’ open responses on our survey about how they use AI, one theme that emerged was that AI-generated content could only work as a “starting point” for their lesson planning, with some teachers explicitly mentioning that they did not like the quality of the content. Given that many teachers modify their traditional curriculum materials extensively (Kaufman et al., 2020; Wang et al., 2021), the need to adjust and adapt is certainly not unique to content generated from ChatGPT and other tools. Further research on the quality of AI-generated classroom content is an essential next step in verifying its use in classroom settings. For instruction to be part of a coherent whole, in which instruction follows from standards that align with assessments of student knowledge and align with teacher training, the new ability to customize instruction via AI must enhance rather than detract from standards-aligned instruction. The training that districts are delivering to teachers at greater rates should provide dos and don’ts regarding the customization of materials.

Beyond the customization or modification of content, a secondary use of AI that, at least thus far, is less common among the teachers we surveyed is to reduce “drudge work,” such as by generating initial

drafts of communications, recommendation letters, or grading. But teachers' comments in open-ended responses suggest that rote work is where AI is working best and, therefore, this may be the area in which teachers' use of AI products and tools grows most quickly. However, it is difficult to accurately predict how teachers will begin or continue to use AI products and tools in the future, as the capacity of and access to AI tools seemingly evolves day by day.

Third, although AI adoption is still in an early phase, the rollout of AI is occurring in a way that could exacerbate longstanding fault lines of educational inequality. Advantaged school districts are ahead in training teachers about AI use. For example, 65 percent of majority-White districts planned to have provided training by the end of the 2023–2024 school year compared with only 39 percent of districts serving mostly students of color. Although so far, teachers' rate of take-up of AI tools and products has been similar in both historically advantaged and historically disadvantaged school settings, we might expect AI adoption to grow more quickly in those districts where more supports are being provided to teachers to incorporate AI into their work.

Furthermore, our data reveal that teachers in high-poverty schools are more likely to use AI to generate lesson plans than their peers in low-poverty schools. This finding comports with prior RAND research, from which we found that teachers who teach greater shares of lower-achieving students—who are often concentrated in high-poverty schools—more frequently modify their instructional materials to make them either more engaging or to better fit students' achievement levels (Wang et al., 2021). The differential rates of using AI-generated lessons plans may further exacerbate differences in the quality and rigor of instruction received by students in historically disadvantaged schools, especially if the quality of the content generated by AI tools is worse on average than the content in published curricula.

In interviews, district leaders worried about equitable access to AI tools and appropriate teacher training if those tools, and the computing infrastructure they require, become too expensive. About one-third of AI-using teachers and nonusing teachers alike identified a lack of PD as a barrier for future AI use. Training for all educators—but especially educa-

To the degree that these generative AI tools *improve* teaching and learning, faster take-up of AI in historically advantaged settings will only widen already large disparities in students' opportunities to learn.

tors in historically disadvantaged settings—is needed to overcome the early gaps that are opening up in districts' plans for trainings.

In summary, we hypothesize that, to the degree that these generative AI tools *improve* teaching and learning—which is still an open question—faster take-up of AI in historically advantaged settings will only widen already large disparities in students' opportunities to learn.

Fourth, teachers' concerns about AI use seem less about school-specific applications and mostly about the impact of AI on relationships and society in general. Regardless of whether they were current users of AI or not, teachers most commonly ranked concerns about “the role of AI in society as a whole” and concerns about data privacy among their top three. Fewer teachers—although still sizable numbers—cited concerns about how AI would be used in educational settings, such as a lack of district guidance or insufficient PD. This suggests that teachers' feelings about AI generally reflect concerns found in the population at large (Faverio and Tyson, 2023; McClain et al., 2023; Tyson and Kikuchi, 2023).

Data Sources and Methods

Teacher Survey

Survey items on teachers' use of AI products and tools in the classroom were fielded as part of the RAND ATP fall 2023 Omnibus Survey. The ATP contains a randomly selected set of more than 25,000 K–12 public school teachers. RAND fielded the omnibus survey to a randomly selected sample of teacher panelists. The fall 2023 ATP survey was fielded in October and November 2023 with a completed survey target number of 1,000 respondents. Respondents were provided with a \$15 electronic gift card on completion of the survey. A total of 1,020 respondents completed the survey. The survey had a 41.5 percent completion rate using the American Association for Public Opinion Research's Response Rate 6 definition.

RAND sampled teachers and weighted responses to be representative of the population of K–12 teachers during the 2023–2024 school year. RAND statisticians created survey weights that account for (1) the individual- and school-level characteristics of each respondent, calibrated so that these characteristics closely matched the characteristics of the national population of public school teachers based on the National Center for Education Statistics' National Teacher and Principal Survey; (2) the probability of selection into the survey sample using the full ATP as a frame; and (3) the probability of a teacher completing the survey.

The AI module of the ATP survey contained seven closed-ended survey items and three open-ended survey items. Open-ended survey items varied in both length and content but were typically only one sentence long. The research team analyzed a subset of items for each of the three open-ended survey items to develop a qualitative coding scheme. All responses for the three items were then double-coded by the research team, with coding discrepancies discussed and resolved between the two coders.

District Survey

The fall 2023 survey of the ASDP was fielded between October 12, 2023, and December 14, 2023. Starting

in fall 2020 and in several waves since, we randomly sampled districts to invite them to enroll in the ASDP. All enrolled districts were invited to complete the fall 2023 survey. Of the 1,167 public school districts that enrolled in the panel between fall 2020 and fall 2023, 231 districts completed surveys (19.8 percent survey completion rate).

We designed the 12-minute survey (which contained two questions about AI) to allow multiple different respondents from the same district central office to complete portions of the survey—for example, a superintendent, human resources director, or research director could answer questions about district staffing levels; an academic director could complete questions about mathematics instruction; and a summer learning coordinator could answer questions about summer programs. We do not know which person(s) in each district completed the survey on behalf of their district.

Survey responses were weighted to be representative of the national population of public school *districts*, not the national population of public school *students*. For more information about the sampling and weighting procedures for the fall 2023 ASDP survey, see Grant et al. (2024).

Survey Analyses

Our methodology for analyzing survey data remains consistent between survey waves. Therefore, the description of our methods that follows is a simply an update from a previous publication (Diliberti and Schwartz, 2023). Because teachers' and districts' experiences vary, we examined differences in respondents' answers by teacher, school, and district characteristics. We obtained data on school and district demographics by linking survey data files to the Common Core of Data issued by the National Center for Education Statistics.

We note that the small number of districts that completed our survey (231) limits our ability to investigate the subgroup differences in detail. That said, for the teacher and district surveys, we analyzed the following three categories, which yielded seven subgroups:

1. locale (*urban, suburban, and rural*)

2. student racial and ethnic composition (we categorize districts and schools in which more than one-half of the student population is Black, Hispanic, Asian, Pacific Islander, American Indian/Alaska Native, or of two or more races as having *majority students of color*, with the remaining districts and schools categorized as having *majority White students*)
3. poverty level (districts and schools in which one-half or more of the student population qualifies for a free or reduced-price lunch are categorized as *high poverty*, whereas the remainder are categorized as *low poverty*).

We also analyzed district survey data by the following category:

1. district size (districts with fewer than 3,000 students are categorized as *small*, districts with 10,000 or more students are categorized as *large*, and the remaining districts are categorized as *medium*).

We analyzed teacher survey data along the following categories:

1. teacher race and ethnicity (as self-reported by respondents, with respondents grouped into the following categories: *White, Black or African American, Hispanic and/or Latino, and teachers who did not identify exclusively as White, Black or African American, or Hispanic/or Latino*)
2. teaching experience (*ten or more years and nine or fewer years*)
3. main subject taught (as self-reported by respondents, with respondents grouped into the following categories: *elementary education, ELA and social sciences, STEM* (which includes mathematics, computer science, and natural sciences), and *teachers of other subjects*).

In this report, we describe only those differences among subgroups that are statistically significant at the 5-percent level, unless otherwise noted. For all survey estimates, we conducted significance testing to assess whether subgroups were statistically different at the $p < 0.05$ level. Because of the explor-

atory nature of this study, we did not apply multiple hypothesis test corrections.

District Leader Interviews

We complemented our survey data with data from interviews conducted with 11 school district leaders. These leaders represent a variety of district settings, from mid-sized suburban districts to small, rural districts. The districts varied in size from one that served fewer than 100 students to one that served more than 22,000 students and in location from suburban to rural areas in seven states.

The leaders that participated in these interviews were in districts that completed the fall 2023 ASDP survey and volunteered during this ASDP survey to participate in a phone interview about their district's AI policy. We conducted interviews with the leaders during December 2023 and January 2024. The interviews were semistructured and touched on the following topics: (1) why and how their districts were working to develop a district-wide AI policy, (2) the content of their districts' teacher training on AI, (3) the barriers and supports their districts had encountered or leveraged when developing a policy or training, and (4) leaders' hopes and concerns regarding AI in general. These interviews lasted between 15 and 35 minutes and each was audio recorded and transcribed. We then coded these data thematically and created matrices to track patterns across respondents.

Study Limitations

We note a few limitations of our analyses. First, although our district survey sample is diverse and has been weighted to represent the national population of public school districts, we have a relatively small sample size (231 districts). This small sample size limits our ability to investigate subgroup differences in more detail. Second, we were only able to conduct interviews with a relatively small number of district leaders (11). Although these district leaders serve in diverse contexts, we cannot be certain how well the experiences of the leaders in these districts generalize to the national population of school districts. None of the districts that we talked to had already adopted a policy regarding students' use of generative AI,

although six were in the process of developing one. It is possible that those district leaders who were willing to speak with us were already in favor of AI use and thus do not represent all school districts' experiences and expectations about AI (although all interviewees did raise concerns about AI). Furthermore, we caution readers that we were not able to conduct interviews with any large districts, which further limits the generalizability of these 11 interviewees' views. Third, the survey and interview responses reflect teachers' and district leaders' perceptions, which may not always reflect their actual experiences.

Notes

¹ In October and November 2023, we surveyed 1,020 K–12 public school teachers on their use of AI tools and products through RAND's fall 2023 ATP Omnibus Survey. This survey was conducted between October 11, 2023 and November 7, 2023. We also used the American School District Panel (ASDP) to survey 231 K–12 public school districts about their policies for AI and plans to provide trainings. In December 2023 and January 2024, we interviewed 11 district leaders about their district's AI policy and any teacher training. Please see the methods section at the end of this report for more details.

² We also asked these questions of teachers who tried using AI products and tools in their work as a teacher but who do not intend to regularly use these products. We omit these teachers from this analysis for clarity in understanding how teachers are using AI in their work. However, our results are not sensitive to this choice.

³ Many tools in these categories predate generative AI. But we included them because several products have recently added AI features, such as Google Classroom's ability to automatically generate interactive questions for YouTube video content. We are unable to determine from teachers' responses to our survey whether they were using the newest AI features in these products.

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About This Report

In this report, the authors use surveys and interviews with educators to take a first look at how AI is beginning to affect teaching and learning in kindergarten through grade 12 (K–12) schools.

The American Educator Panels (AEP) are nationally representative samples of teachers, school leaders, and district leaders across the country. The panels are a proud member of the American Association for Public Opinion Research’s Transparency Initiative. If you are interested in using AEP data for your own surveys or analysis or in reading other publications related to the AEP, please email aep@rand.org or visit www.rand.org/aep. Through the AEP Data Portal available from that site, researchers can download survey data files to perform their own analyses. The American School District Panel (ASDP) is a research partnership between RAND and the Center on Reinventing Public Education. The panel also collaborates with several other education organizations—including the Council of the Great City Schools and Kitamba—to help ensure we produce actionable results. For more information, visit the ASDP website at www.americanschooldistrictpanel.org.

This series is intended to provide brief analyses of educator survey results of immediate interest to policymakers, practitioners, and researchers. If you would like to know more about the dataset, see *Technical Documentation for the Eighth American School District Panel Survey* (Grant et al., 2024) for more information on survey recruitment, administration, and sample weighting.

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