

Avoiding ‘Sinking the Boat’ While not ‘Missing the Boat’: K-12 Leaders’ Early-on Perspectives of AI Risks and Benefits and Their Implications for Developers

Sharon Mason
School of Information
Rochester Institute of Technology
Rochester, NY
Sharon.Mason@rit.edu

Raffaella Borasi
Warner School of Education
University of Rochester
Rochester, NY
RBorasi@Warner.Rochester.edu

David Miller
Warner School of Education
University of Rochester
Rochester, NY
dmiller@warner.rochester.edu

Patricia Vaughan-Brogan
Warner School of Education
University of Rochester
Rochester, NY
patricia.brogan@rochester.edu

Yu Jung Han
Warner School of Education
University of Rochester
Rochester, NY
yhan18@u.rochester.edu

Karen DeAngelis
Warner School of Education
University of Rochester
Rochester, NY
kdeangelis@warner.rochester.edu

Abstract— This full research to practice paper reports on early perspectives from K-12 leaders regarding AI use in schools. With the advent of generative AI applications, K-12 leaders have a key role in providing (or precluding) access to students and teachers’ uses of AI tools - as superintendents, principals and other district and school-level administrators will continue to be making (or at the very least informing) decisions about what AI tools will be made available as well as policies governing their use. These decisions will be informed by what K-12 leaders perceive are the potential risks and benefits of AI - as a key charge for K-12 leaders considering any innovation is to evaluate its potential to support student learning while reducing potentially harmful consequences. It is important to understand these current perceptions, especially for anyone designing applications of AI for K-12 education.

While previous work has reported on teachers’ views of AI, the perspectives of K-12 leaders, who serve as thought-leaders and decision makers, remain largely unexplored. Using a semi-structured interview protocol, in late 2023, researchers interviewed 36 K-12 leaders across 23 districts in western New York state in order to gather their early perspectives regarding AI and to answer the research question: How do K-12 leaders perceive the risks and opportunities associated with using artificial intelligence in their school environments? Participants included superintendents, principals and various district and school-level administrators as well as some teacher leaders. These K-12 leaders articulated risks that can be categorized by four themes: (a) concerns regarding the ethical use of AI by both students and teachers (including cheating), (b) concerns around privacy and cybersecurity, (c) concerns around the accuracy or legitimacy of the output from AI systems and (d) concerns about replacing people/jobs. At the same time, these K-12 leaders recognized several important opportunities presented by AI, which should also be taken into consideration when making decisions, including (a) preparing students for the future, (b) improving potential for

learning and instructional development and (c) supporting K-12 educators. Collectively, these risks and opportunities can be characterized with the idea that K-12 leaders were aware of the need to balance the risks in order to not “sink the boat” while also using care to not delay actions and potentially “miss the boat,” and which represents a more nuanced view of risk, consistent with what has been identified in the entrepreneurship literature.

This work has implications for deliberate and informed decision-making regarding policies for and use of AI in the K-12 domain, and the supports needed for their adoption and effective use. The findings also provide valuable insights for developers of domain specific AI systems for K-12 schools. As computer scientists and engineers continue to train models, develop and select algorithms to serve schools, learners and educators, considering the risks and opportunities articulated by K-12 thought leaders and decision makers can support their work in advancing the technologies and potentially improving adoption.

Keywords—artificial intelligence, K-12 leaders, K-12 schools

I. INTRODUCTION

With the advent of generative AI applications, K-12 schools find themselves in need of making important and time-sensitive decisions related to their use. In general, K-12 leaders’ practices and policies can greatly influence the adoption of technologies, and as a result, their impact on K-12 education. This is particularly true regarding practices and policies about what AI tools can be used, how they can be used and by whom they can be used, which in turn have the potential to accelerate or stifle their adoption. In addition, K-12 leaders must consider any technology’s potential to support learning, while they are at the same time responsible for reducing potentially harmful consequences. Given the rapidly evolving advancements in the landscape of AI applications and technologies, being able to

thoughtfully leverage AI applications to benefit students and teachers requires an urgent level of support in order to make necessary decisions. To date, the literature has focused on teachers' perspectives on using AI in K-12 schools, reporting overall positive perceptions of and openness from K-12 teachers about its integration into and implications for educational settings, with a mix in comfort levels and understandings [1], [2]. While teachers' views on AI are significant, the perspectives of K-12 leaders, who serve as thought-leaders and decision makers, have so far received less attention. Thus, the following research question guided our qualitative study:

RQ: How do K-12 leaders perceive the risks and opportunities associated with using artificial intelligence in their school environments?

Borrowing from the field of entrepreneurship for a more nuanced analysis of risk (as articulated in more detail in the Conceptual Framework section), we will report on interview data about K-12 leaders' perspectives for weighing and balancing AI risks and opportunities to be sure that they neither 'sink the boat' nor 'miss the boat' as they work to move their schools forward and prepare the future workforce. Findings from this study have implications for deliberate and informed decision-making regarding policies for and use of AI in the K-12 domain, and should also be taken into consideration by developers of domain specific AI applications for K-12 schools to ensure that their products will be considered for adoption.

II. RELATED WORK

For decades before the recent advent of generative AI, artificial intelligence has been used in K-12 education in running complex data analysis on student, teacher, administrator and staff activities and performance (e.g. graduation rates and test scores) for predictive analysis that leads to educational decisions and policy-making [3], [4], [5], [6], [7]. Little consideration was made about the overall implementation or implications for these data sets within the larger context of AI, that now includes generative use. With the rapid evolution of AI and use in content creation, design, music and image creation and text development, the opportunities and considerations around AI use in K-12 schools are broadening. However, current work on the use of AI in K-12 education has to date primarily focused on its applications, research, benefits and concerns regarding learning with AI [8], and perceptions regarding AI in K-12 education have been considered with a focus on classroom activities [2], [9], [10], [11], [12]. K-12 leaders' perceptions, when explored at all, have most often been investigated as part of a larger population including teachers, and with a focus on classroom activities [9].

Among the limited studies reporting the latest perceptions of school leaders on AI in K-12, perceptions were mixed [13], [14], [15]. This is not surprising, as the technology has unprecedented generative capabilities that bring significant impacts on K-12 educational systems [9], [16]. Among the challenges, K-12 leaders in these previous publications reported a need for more direction regarding AI tools, acceptable use policies, a lack of urgency for teacher training, and issues of equity and access that are only just emerging [13]. The mixed perceptions, and especially the negative perceptions, have been linked to barriers and challenges perceived by K-12 leaders around integrating AI

technology in schools, not having clear guidelines and lacking knowledge and understanding of AI and the associated ethical issues [17]. However, K-12 leaders still report work on integrating AI into their schools, and have focused on active engagement in conversations and creating organizational structures to accomplish this [14].

III. CONCEPTUAL FRAMEWORK

To analyze and make sense of K-12 leaders' perceived risks and opportunities of using AI in K-12 schools as revealed in our interviews, we looked to the field of entrepreneurship for a more nuanced conceptualization of the risks involved when engaging in an innovation. While not common, there are some notable examples where applications of entrepreneurship concepts and principles have already been used with success in education, especially when considering what may increase the chances of success of a given innovation [18], [19].

As well stated by Brown and Cornwell [18], "taking risk is a part of any decision making taken in school" (p.11), although it is also important to keep in mind that in K-12 schools "traditionally, there is little reward for taking entrepreneurial risks and succeeding, while there is significant personal and professional cost associated with taking such risks and failing" (p.11). Two types of risks are also distinguished: "sinking the boat" risks (when you pursue an innovation and it fails) and "missing the boat" risks (when you miss a valuable opportunity for your organization, either because you do not identify that opportunity in time, or because you choose not to pursue it) [18]. The authors also pointed out that school systems tend to be more concerned about "sinking the boat" kinds of risks as failed innovation "can bring intense scrutiny by tax-payers and the media" (p.12) [18]. In contrast, these authors observed that K-12 leaders seem to be held much less accountable for "missing the boat," although missing valuable opportunities may turn out to be equally impactful for their schools in the long term.

We use the concepts of "sinking the boat" and "missing the boat" risks when analyzing K-12 leaders' perceptions about using AI in K-12 schools, while also taking into consideration the different consequences of these two types of risks for K-12 leaders making AI-related decisions.

IV. METHODS

Using their community connections combined with a snow-ball strategy, researchers recruited and interviewed eight superintendents, 11 technology directors (or equivalent titles), nine district-level administrators in charge of curriculum/instruction, five K-12 principals, two teacher leaders/instructional coaches, and one business official, representing 23 school districts across western New York. Collectively, we refer to this group of 36 participants as "K-12 leaders" in what follows. All of the hour-long interviews were conducted via Zoom from October-December 2023 using a semi-structured protocol guided by 11 open-response questions. The questions informing the findings that follow centered on participants' perceptions about potential risks and opportunities for schools regarding AI, and in particular considered various stakeholders such as students, teachers, parents, school building leaders, and school district leaders. The IRB approved protocol and questions were informed by a "customer discovery

approach” in order to gain understandings about K-12 leaders’ challenges, needs, and solutions for those needs, acutely aligning with the research question regarding risks and opportunities [20], [21]. The interviews served as one data collection mechanism that is part of a larger study addressing AI use in K-12 education.

Interviews were transcribed using Rev, a transcription service provider, and broken down into de-identified “stanzas” (groups of lines capturing the response to a specific interview question) in order to create manageable units of study, which were imported into the qualitative analysis software NVivo. Stanzas were then manually and independently coded by two researchers using a thematic qualitative coding approach. Researcher analyses were compared for investigator triangulation and also discussed during team meetings as peer debriefings for internal validation.

V. FINDINGS

The K-12 leaders we interviewed articulated both “sinking the boat” and “missing the boat” risks with respect to AI uses in K-12 schools, and as reported in what follows.

A. “Sinking the Boat” Risks Articulated by K-12 Leaders about AI

K-12 leaders described four key concerns or risks about using AI in their schools and classrooms. Each concern was clearly grounded in a strong sense of commitment to education and the students, teachers and school community that they were serving.

a) Concerns Regarding the Ethical Use of AI for Both Students and Teachers (including cheating): K-12 leaders raised concerns about the ethics of using AI for both students and teachers. Some of these concerns stemmed from teachers regarding the possibility for student cheating, or avoiding/minimizing the assignment tasks and resulting in not meeting the intended learning outcomes. One principal explained,

We have the teachers that are scared of it because of what it could mean for our kids. If our kids are going into ChatGPT and plugging in, write me an essay on [a topic] and it’s coming up, well what does that mean? Then I don’t really get an accurate indication of where my kids are at and now I have to do so much more work to progress monitor them because of AI.

Detecting academic dishonesty as well as managing academic dishonesty allegations were noted as specific concerns in this area. A principal shared, “AI detection, it’s not [clear] or black and white.” Another principal suggested that

I think [there is] a knee jerk reaction toward a prohibitionist stance on any technologies that are new or not well understood and might be a threat. So I’m afraid that we’re going to risk avoiding the conversations by just stuffing it in the closet and locking the door.

From the faculty side, K-12 leaders raised questions about whether or not using AI for professional tasks like creating lesson plans or providing individualized student feedback may

be considered “cheating.” We heard from one curriculum/instruction administrator:

I’m grappling with the idea of auto-generated lesson plans. And if the learning of the new teacher is through taking the time of writing the lesson plan and thinking through that at the deep level, how different is that than a student generating an essay automatically through chatbot?

b) Concerns Around Privacy and Cybersecurity: The next “sinking the boat” risk that K-12 leaders identified revolved around privacy and cybersecurity. While not all the K-12 leaders we interviewed specifically cited the New York State Education Law 2-d (2015) for protecting students’ privacy, this was undoubtedly the basis of their concerns, leading many to ban students’ use of AI in their schools, at least for the moment. This law prohibits the unauthorized release of personally identifiable information held by schools and school districts related to students and school personnel [22]. One technology director shared concerns about educators inadvertently inputting confidential data that can “leak” or be exposed:

So we have folks that are no, absolutely not AI, no, it’s from a privacy standpoint, I don’t want information going out there. I don’t understand where it’s going, where is that being stored, where is it being used?

Interviewees also expressed concerns about potentially exposing their K-12 schools to additional cybersecurity threats because of AI. Another technology director explained that

What you put in, it becomes open source and can be fed to other places. Bad actors can get in there and garner some information. So ... I would never put my cybersecurity plan or consult with it about my cybersecurity plan or any security plan because it opens up opportunit[ies] for bad actors to take a look at that.

Yet, K-12 leaders also recognized the tension and delicate balancing required between cybersecurity and leveraging AI systems for instructional purposes. One superintendent shared,

Maybe we should be looking at easing restrictions on a certain group or a small number of people and trying to just tiptoe our way through it till we learn more. ... There’s the push and pull between instruction and our IT folks who are looking at it and the cyber safety lens and security and insurance and all of the risks that are truly involved if something catastrophic were to happen.

c) Concerns About the Accuracy or Legitimacy of the Output from AI Systems: Another key concern raised by K-12 leaders centered on the accuracy, correctness and bias of the output generated from AI systems. They recognized the notion of AI tools “hallucinating,” where nonsensical, inaccurate, misleading or even false information is output as fact, and one technology director explained:

We still need to keep these lenses of accuracy. If ChatGPT is pulling info from the internet and you put in there the Holocaust isn’t real, it’s going to write something. So ... it can help us make that decision, but

I think we also have to be aware ... that the information it's giving us is accurate and true and factual.

K-12 leaders also articulated the need for human review of AI-generated products, and not simply accepting any and all results, which could result from being over-reliant on the technology. A curriculum/instruction administrator told us,

... if we just did it and said, here, I'm just going to take whatever, that's a risk to me. ... You're not looking at it. You're not ensuring that it's truly of the level of quality that you need, and that takes a little bit of work, but it takes less work than designing it from the beginning. So I think it's exciting, but I think the risks are there in your professional use. If you do it quickly, you don't look at it, it's going to be problematic.

Some also called out possible biases, recognizing that AI-generated output may not be accurate or legitimate because of the inputs to the training model. A technology director shared their thoughts with the following:

What bias exists because ... if you have people that are feeding it a certain viewpoint, is that going to then start dominating and changing what that looks like? Which again goes to the human side of things and us being able to really critically analyze information, validity of information, viewpoints, you get into that whole world.

d) *Concerns About Replacing People and/or Jobs:* A few K-12 leaders acknowledged concerns that the efficiencies made possible with AI would lead to job loss for educators. One technology director explained,

I think staffing is a fear... Is it really going to have an impact on staff or is that going to shift things? ... And I know HR is thinking about it. ... Some of [the staff] are looking at their own position saying, is my position going to go away? ... AI can't do it all. It can help. But yes, that I think would be the worries, the challenges and opportunities depending on how our mindset is when we dive further.

In a related note, some K-12 leaders more specifically articulated the importance of AI skills in the context of the future job force. A teacher leader/instructional coach explained,

I think there [are] some concerns about 'what does it mean to the workforce and the job force?' I think the big message around that is that AI is not going to take your job. Someone who's skilled with AI is going to take your job.

In contrast, some recognized the unique role teachers play in educating students, along with the importance of evaluating the accuracy and legitimacy of the AI output noted earlier. In the context of a professional development session for teachers on AI, another teacher leader/instructional coach shared their thoughts:

I try to make it a positive experience their first time in. But also, this isn't here to replace anyone. This isn't here to replace a teacher. It's not here to teach for you. You still have to vet everything.

B. *AI Opportunities and Related "Missing the Boat" Risks Articulated by K-12 Leaders*

The K-12 leaders we interviewed also identified several complementary ways in which AI could provide valuable new opportunities for K-12 schools, while at the same time recognizing that "missing" those opportunities would be detrimental for their schools.

a) *Preparing students for the future:* K-12 leaders were very clear in recognizing the need to prepare students for a future where AI is tightly integrated into the workforce. A curriculum/instruction administrator summed up this idea with:

Global implications are huge. I think ... information, misinformation, politics, copyright, and what that looks like for artists, what that looks like for the knowledge industry. I think that you think about those major revolutions - and we all know that there was the knowledge revolution - but when all that stuff is at your fingertips and easily accessible and manipulated, I think that that's going to be in five years or even less a completely different landscape.

K-12 leaders were also aware that this dovetails with a need to prepare all students around AI citizenship, where it will be important for them to use AI effectively, safely and ethically in their everyday life. We heard from a superintendent who explained,

Again, I worry that if we aren't educating kids on the ethical use of AI and other technologies, including social media, we may be missing the mark in regards to preparing kids to be contributing citizens in their community and in their country. I worry that too many kids and adults are looking at information that could potentially be generated by AI or promoted by different algorithms and things like that as fact without really digging in and vetting the source. And that's why we're looking at [the] theory of knowledge course, a course that we want all students to take.

Indeed, K-12 leaders felt schools had a responsibility to prepare students for these new realities.

b) *Improving learning and instruction:* An appreciation for AI's ability to support student learning was revealed in a number of different ways. While K-12 leaders noted that simply copying and pasting results generated from AI would not serve students well, they also identified the value of having AI act as a 'thinking partner' for both students and teachers. A superintendent explained this idea and shared,

I think that it has the ability to really help kids from an instructional perspective. I'm going to start with this can really help kids get ideas. I think that the direct copy paste AI ... is still wrong because we're not able to see what that student really does think, but I kind of see it as another way for a student to get another lens on something that they are trying to do. So for example, you look at a student, ... they're going to ask their teacher, Hey, how about this? How do I get feedback on this? This is a way for them to go do it on their own

as long as they don't copy and paste it from a plagiaristic perspective.

Continuing with the idea of supporting teaching and learning, these K-12 leaders were optimistic that AI could aid educators in their instructional development and daily work by saving time and providing useful outputs. One technology director shared specific thoughts about teacher support:

We've cultivated professional learning opportunities in AI strictly for new teachers, how to get yourself off the ground with lesson planning, writing learning targets. I didn't learn how to write learning targets until I was years into this.

K-12 leaders were also thinking about opportunities for AI to support teachers as they develop individualized learning experiences for students, including translations and other support structures for English language learners and enabling accommodations for students with different abilities. One principal explained ideas circulating throughout their school by sharing,

I've kind of tossed around with our world language department is do you think that students who are using Google Translate ... recognize that as cheating or is it so commonplace and normalized that it's not something that occurs to an adolescent or a pre-K student that this is not necessarily how the learning is designed or how the knowledge is acquired?

A superintendent echoed similar ideas with:

[It could] really open up doors for those ... who have disabilities. ... You look at Steven Hawking, the ability to speak with what he had. ... if there's no physical way for a person to do that, but there's a connection somehow to AI, that's pretty amazing stuff. If that stuff can happen, it would be cool. I think there's a lot of exciting times. It's just a matter of how do we navigate through the way that we use it in an ethical and productive and efficient and effective way.

These examples indicate K-12 leaders' awareness that choosing not to pursue AI opportunities may result in increasing existing inequities.

c) Supporting K-12 educators: Aligning with the idea of efficiency in daily work, leaders identified the notion of AI effectively supporting teachers and administrators in their duties outside of student instruction. One technology director shared an idea of what this might look like:

We've talked a couple times with our larger administrative team about just ways to simplify daily tasks, emails, letters of recommendations, disciplinary stuff. How can we just streamline things that are simple tasks that take time to do but could be done and then modified through the use of AI.

Some K-12 leaders also explicitly recognized that, since schools are already experiencing issues with retaining teachers and administrators due to feelings of being overwhelmed, especially post-pandemic, banning AI use may be missing a valuable opportunity to help them find their job more

manageable and desirable, and thus decide to stay instead of leaving. One technology director summarized this with:

We struggle with retention with any staff. So is AI an opportunity to help with retaining because we know people are inundated. So if it can create efficiencies for people and eliminate some mundane tests that maybe take a lot of time but can be efficiently done, so they're freed up to do some of the bigger things and not feel overwhelmed, I think that's an opportunity.

VI. DISCUSSION, IMPLICATIONS AND CONCLUSIONS

This study interviewed 36 Western New York K-12 school and district leaders in a variety of roles to gather their perceptions about using AI in their schools, and used the entrepreneurial concepts of "sinking the boat" and "missing the boat" risks to interpret the data.

These K-12 leaders articulated four key types of "sinking the boat" risks: (a) concerns regarding the ethical use of AI by both students and teachers (including cheating), (b) concerns around privacy and cybersecurity, (c) concerns around the accuracy or legitimacy of the output from AI systems and (d) concerns about replacing people/jobs. They also identified several valuable opportunities presented by AI along with their related "missing the boat" risks, which included (a) preparing students for the future, (b) improving potential for learning and instructional development and (c) supporting K-12 educators.

Most leaders seemed to be aware of the tension among these two types of risks, as well as cognizant of the importance of making decisions about the use of AI in their schools that were not too conservative due to fear, but rather would balance both "sinking the boat" and "missing the boat" types of risk. Thus, our interview data indeed revealed much greater sophistication than what has been found in the earlier literature, where the concern seemed to be more on avoiding student cheating, along with a desire to postpone decision making about AI if at all possible [13].

Overall, the K-12 leaders we interviewed also showed awareness and consideration of many of the opportunities that AI may present for K-12 schools - a key first step for the evaluation of "missing the boat" risks identified earlier. While K-12 leaders weighted "missing the boat" and "sinking the boat" risks differently, ending up with different decisions about the extent to which AI tools are currently allowed or banned in their schools, they seemed to recognize that AI is not something they can ignore, and seemed more sensitive to the importance of considering "missing the boat" risks than what was reported in the previous literature [18].

The specific types of risks identified by these interviews should also be taken into serious consideration by developers of AI applications for K-12 education. If AI technology developers want to increase the chance of their products being adopted, it is important to understand that K-12 leaders will be responsible for making the final determination, and such a decision will be informed by their efforts to balance "sinking the boat" and "missing the boat" risks.

In particular, it will be especially important for developers to ensure that they can eliminate K-12 leaders' concerns about

privacy and cybersecurity by not only attending to these issues in the design of their products, but also being explicit and clear about how their products address these issues. In New York, where laws about student data privacy are in place, having an AI-powered product that is compliant with these laws could make or break its adoption, and this should be considered in the broader context of other states with similar laws.

Attention to minimizing possible inaccuracies, as well as providing easy ways for users to monitor and validate AI outputs, will also be important. Ensuring that the AI models are trained on data that reflect diversity, and sharing this information, will also increase users' confidence about the outputs being produced.

Broad adoption of AI applications in education will likely increase whenever an AI-powered product can be shown to address specific opportunities identified among the key "missing the boat" risks such as supporting AI literacy development to better prepare students for the future, leveraging specific affordances of AI to improve equity and learning opportunities for currently underserved populations, and providing K-12 teachers and administrators with time-saving tools that can make their jobs more effective and rewarding.

In summary, regardless of the decisions that will be made about AI adoption, K-12 leaders are clearly facing a complex situation of balancing the risks of overcautiousness and inaction against hasty adoption so as to neither 'sink the boat' nor 'miss the boat' with this new technology. It will be important for computer science and engineering developers to consider the needs of learners and educators in education-related domains, and in particular the K-12 school use case, as they continue to train models, develop and select algorithms and measure the performance and output of emerging AI applications to serve schools, learners and educators. The risks and opportunities articulated by K-12 thought leaders and decision makers can support their work in advancing the technologies and potentially improving adoption as we all move ahead with this rapidly evolving technology.

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