Synopsis of February 25, 2025 Webinar, "Assessment for Deeper Learning: Becoming High School Student Researchers in the Age of AI: Insights from a Student-led Study of Improving Reading with Chatbots

Panelists: Hudson Etkin, Kai Etkin, Dr. Ryan Carter, and Dr. Cammie Rolle

Moderators: Dr. Brent Duckor and Dr. Carrie Holmberg

High School Student Researchers in the Age of AI: Insights from a Student-led Study of Improving Reading with Chatbots

High School Researchers in the Age of AI: A Student-Led Inquiry into Chatbots and Reading Comprehension

In an era where artificial intelligence (AI) is reshaping education, a pair of high school students are proving that young minds can conduct rigorous, research-driven inquiry. In a recent webinar hosted by the **Center for Innovation in Applied Education Policy (IAEP)** at San José State University, high school seniors **Hudson Etkin** and **Kai Etkin**—alongside their mentors, **Dr. Ryan Carter** and **Dr. Cammie Rolle**—presented the findings of their student-led study on the impact of AI chatbots on reading comprehension.

Moderated by **Brent Duckor** and **Carrie Holmberg**, the discussion provided compelling insights into how student researchers are tackling real-world educational challenges. Their findings challenge the assumption that AI-powered reading tools are universally beneficial, highlighting the need for more nuanced implementation strategies.

The Research: AI, Reading Comprehension, and Differentiated Impact

Hudson and Kai Etkin, seniors at **Los Altos High School**, embarked on their research journey after noticing the rapid integration of AI tools like ChatGPT into students' daily learning experiences. Initially, they sought to build an AI-enhanced textbook platform, but they soon realized that there was a **lack of empirical research** on AI's actual effectiveness in supporting reading comprehension.

Their study, accepted for publication in *Frontiers in Education*, examined the impact of AI-driven tools on reading comprehension using **230 college-aged participants** recruited via an online research platform. Participants engaged with AI-enhanced reading tools and were subsequently tested using **standardized reading comprehension assessments**, modeled after **ACT-style passages**.

The findings were **startling**:

- **Students with lower baseline reading proficiency** benefited significantly from AI interventions, improving their comprehension scores.
- **Students with higher baseline proficiency**, however, saw their scores decline when using AI-powered tools.
- The effectiveness of AI tools was strongly correlated with **pre-existing reading ability**, suggesting that AI can **both help and hinder** learning outcomes depending on the learner's starting point.

As Kai Etkin put it, "The same AI tools that **boosted outcomes by 20%** for some students actually **hurt performance by 20%** for others." The implication? **AI integration in education requires careful implementation, rather than a one-size-fits-all approach.**

Implications for Schools and AI in Education

The study's results highlight **an equity-driven perspective** on AI in education: AI chatbots could serve as a powerful equalizer for students struggling with reading comprehension, but **without proper scaffolding**, they could also **disrupt learning** for students who already have strong foundational skills.

This raises an important question for educators and policymakers: **How do we determine which students will benefit from AI tools and which may be negatively affected?**

Hudson and Kai proposed **several key recommendations** for schools:

1. **Pilot AI interventions** before full-scale implementation—rather than assuming AI will help all students, educators should **test tools in controlled settings** to determine their effectiveness.
2. **Use diagnostic assessments** to identify which students will likely benefit from AI tools, rather than applying them universally.
3. **Prioritize empirical evidence over marketing claims**—many ed-tech companies promote AI tools as "transformative," yet research into their **real impact remains limited**. Schools should **base adoption decisions on data, not hype**.

Kai then noted:

> *"So when we initially had this question, we wanted to know what is the effect?*
> *We expected that like this that these tools that I've seen this this and this product have,*
> *and whatever... we expected that these tools would have a positive effect. And so but*
> *what we did was we ran a pilot. We built our whole portal, built everything, and we ran a*
> *pilot study in 15 people. And it was a small data set.*
>
> *But what we found was this differential effect where it helps, the tools help lower*
> *performance, but actually hurt higher performance. And that was just completely out of*
> *out of the blue. We did not expect that at all. So I think that that makes a case for pilots*
> *like Khan Academy.*
>
> *They're building their own AI system right now. And what they're doing is they're doing a*
> *lot of pilots by going into one district and there or going to one district, one school, one*
> *classroom even, and they're having the kids use it. And then they sit there and they*
> *watch them and they look at the data and basically use this pilot to figure out like these*
> *effects that they wouldn't have anticipated and how to and how to like make these tools*
> *better iteratively.*
>
> *And then I found an example in the New York Times actually, this, this chat bot that did*
> *not, they didn't pilot anything. They just went full into the, the LA, Los Angeles School*
> *District called Ed, and then the company went bankrupt for fraud or something. It was*
> *just a whole mess. But that it was it actually harmed the outcome because it didn't take*
> *the caution that they they assume that it is AI.*
>
> *Everybody saying the AI is going to democratize education, whatever. They assumed*
> *that it would work. So they just put into schools full blast and And that is just like, like and*
> *that carelessness can actually harm outcomes. And like students' learning outcomes that*
> *should not be messed with, that we should have the utmost caution with those*
> *outcomes. And which is why I just like I think just pilot, pilot, pilot, because there's no*
> *harm to doing some type of pilot like that, except, yeah, there's just no harm to it."*

These insights come at a time when **AI tools are being rapidly integrated into classrooms**, often without a clear understanding of their impact. As **Dr. Carter**, a veteran **counseling educator and research fellow at IAEP**, pointed out, "AI has gone from being seen as a form of academic dishonesty to being integrated into school systems within a year. We need more research to ensure we're using it responsibly."

The Experience of Student-Led Research

One of the most compelling aspects of the webinar was its demonstration of **how high school students can engage in meaningful academic research**. Unlike many high schoolers who gain research experience through **data entry roles in university labs**, Hudson and Kai

designed and conducted their own study from start to finish—including coding the AI-enhanced reading tools, recruiting participants, and analyzing results.

For students and educators interested in conducting similar research, Hudson and Kai emphasized **three essential factors**:

1. **Find strong mentors** – Their work was supported by **Dr. Carter and Dr. Rolle**, who provided **expertise in research methodology and data analysis**.
2. **Become self-directed learners** – They relied on **YouTube tutorials, research papers, and AI tools** to **teach themselves statistics and methodology**.
3. **Engage deeply with literature** – Understanding **existing research** helped them **formulate a novel study**, rather than reinventing the wheel.

Dr. Rolle, a **Stanford-trained neuroscientist**, underscored the significance of their approach:

> *"Most high schoolers who want research experience end up doing basic data entry in university labs. Hudson and Kai flipped the script—they conducted an actual study, asked meaningful questions, and produced real findings. This is what real research looks like."*

The Role of AI in Conducting Research

Interestingly, AI was not just the subject of their study—it was also a **valuable research tool**. The students used AI in multiple stages of their project:

- **Automating data extraction** from ACT practice exams
- **Generating code** for their research portal
- **Synthesizing academic literature** to aid in their literature review

However, they **cautioned against over-reliance on AI**, noting that some AI-generated research summaries **included flawed or misleading sources**. As Hudson put it, *"AI can be an incredibly powerful research assistant, but it still requires human critical thinking."*

Bridging the Gap: What Schools Can Do to Support Student Researchers

The success of this student-led study suggests that **high school research opportunities should be expanded and better supported**. **Dr. Carter**, who also serves as the high school counselor for both students, noted that their school's **Advanced Scientific Investigations (ASI) program** provided a **structured environment** for students to explore independent research.

For schools looking to **foster student-led research**, the panelists recommended:

- **Creating dedicated research programs** that provide guidance on research methodology, ethical considerations, and publication pathways.
- **Tapping into educators' hidden expertise**—many teachers and counselors **have research backgrounds** that could be leveraged to mentor students.
- **Connecting students with mentors early**—having a **trusted advisor** can make the difference between a **failed experiment** and a **published study**.

A Model for Future Student Research

The work of **Hudson and Kai Etkin** is a **blueprint for what is possible** when students are given **agency, mentorship, and the right tools**. Their study challenges the assumption that **AI is universally beneficial in education** and opens up critical conversations about **how schools should approach AI integration with caution and research-backed strategies**.

Professor Duckor asked Dr Carter, "Since you are the liaison, literally between our Center and your school, as well as the person who's seeing things from multiple perspectives, why don't you take us out with a few thoughts?"

Dr Carter replied:

"There are, I'll speak more, toward recommendations for schools. Hudson touched on the program that we have at Los Altos High School, which is, um, called Advanced Scientific Investigations. This is a program that really grew, has really grown significantly over the last several years. We went from one section with one teacher. We now have two teachers teaching this course. And it really gives students an opportunity to explore, research and develop through project-based learning. I would also say to schools to tap into the existing talent that you have that you may not realize is there for the purpose of mentorship.

You know, you have a lot of teachers, educators, counselors, administrators who are not teaching as their first career. They have backgrounds in scientific research, and they have backgrounds in business. And they are a wealth of expertise to share with students. And it may be hidden, based on what they're teaching day in and day out. And so I really like exploring schools when you're going to get innovative with curriculum, looking in your own backyard and seeing what's there, because you probably have way more talent for mentorship than you might even realize on a daily basis.

Same with your students. You know, if there's one thing I've learned from, Hudson and Kai, it's just, I mean, we have some incredible students at our school. But these two, I mean, they are ready now to mentor other young, aspiring researchers on things like, Dr. Duckor, you mentioned the IRB process. They've been through it. On building literature review. You know, they're ready to help support other students. And I'm going to work with Kai on that next year, hopefully as he moves into that ASI program, because I think he could really help some other people aspiring toward publication.

So I think the last thing I'll just say to schools is don't underestimate the student interest in research, as Dr. Rolle said, there is immense interest, in student research and the program, like ASI has really helped students who historically have had to just make cold calls to professors at Stanford to get their foot in the door in any kind of research. And that used to be what they all did all the time. And now they, you know, they're still doing that and that's great. And they also have this program at school where they're getting project-based learning and research mentorship there as well.

So those are just some ideas for schools."

In closing, the panelists emphasized that **high school students can—and should—be involved in cutting-edge research**, especially in rapidly evolving fields like AI. As Dr. Duckor reflected,

"For decades, we've dreamed of student-led, project-based learning that is truly meaningful. What Hudson and Kai have done is proof that the future of student research is already here."

The full webinar, hosted by **IAEP at San José State University**, is available for viewing on the center's website. **For educators, policymakers, and students looking to engage with AI in education, this discussion provides a critical starting point.**