Auburn University
College of Education

Boston University
Wheelock College of Education and Human Development

Boston College
Lynch School of Education

Florida State University
College of Education

Georgia State University
College of Education & Human Development

Indiana University
School of Education

Iowa State University
College of Human Sciences

John Hopkins University
School of Education

Lehigh University
College of Education

North Carolina State University
College of Education

Oklahoma University
Jeannine Rainbolt College of Education

Penn State University
College of Education

Purdue University
College of Education

Syracuse University
School of Education

Texas A&M University
College of Education and Human Development

The Ohio State University
College of Education and Human Ecology

University of Arizona
School of Education

University of California – Santa Barbara
Gevirtz Graduate School of Education

University of Central Florida
College of Community Innovation and Education

University of Connecticut
Neag School of Education

University of Florida
College of Education

University of Georgia
School of Education

University of Houston
College of Education

University of Illinois Urbana-Champaign
College of Education

University of Kansas
School of Education

University of Maryland College Park
College of Education

University of Minnesota
College of Education and Human Development

University of Missouri
College of Education

University of Nevada-Reno
College of Education

University of North Carolina
School of Education

University of Oklahoma
College of Education

University of Oregon
College of Education

University of Pittsburgh
School of Education

University of Southern California
Rossier School of Education

University of Texas at Austin
College of Education

University of Vermont
College of Education and Social Services

University of Wisconsin – Madison
School of Education

University of Wyoming
College of Education

Vanderbilt University
Peabody College of Education and Human Development

Virginia Commonwealth University
School of Education

LEARN℠ Learning and Education Academic Research Network
*Advancing the Sciences of Teaching and Learning*

August 23, 2021

Mark Schneider
Director of the Institute
of Education Sciences (IES)
550 12th Street SW
Washington, DC 20024

Erwin Gianchandani
Deputy Assistant Director for Computer and
Information Science and Engineering (CISE)
2415 Eisenhower Avenue
Alexandria, Virginia 22314

Dear Director Schneider and Dr. Gianchandani,

As co-chairs of the LEARN Coalition, we are writing to respectfully provide examples of Artificial Intelligence (AI) application in the education research field. The Learning and Education Academic Research Network (LEARN) is a coalition of the Deans of leading research colleges of education across the country. LEARN supports key investments and policies aimed at advancing research to further the scientific understanding of learning and development, and we recognize the critical role both IES and NSF play in ensuring that evidence-based research is implemented and applied to schools and Universities nationwide.

Congress, recognizing the need to invest in an evidence-based response to learning loss, included $100 million in the American Rescue Plan (ARP) Act to IES for this purpose. While the COVID-19 pandemic has further reinforced the importance of the role that technology can play in education, our understanding of the impact of AI in this field remains in its infancy. NSF has capitalized on this reality by establishing 11 new NSF National Artificial Intelligence Research Institutes and investing $220 million in AI innovation, including in the education field. LEARN applauds NSF for making such a timely investment in the future of AI and encourages them to consider expanding their partnership to other interested organizations, like IES.

Notably, the directorate for Computer and Information Science and Engineering (CISE) is uniquely situated to support the advancement of virtual learning by investing in innovative AI solutions in the education sector. Consequently, LEARN members are excited about the impact that a partnership between IES and NSF could have in furthering the use of AI to address learning loss and other educational challenges. This letter provides examples of the most up to date and effective AI educational interventions from five leading Schools of Education.

**Indiana University**

Indiana University School of Education's Center for Research on Learning & Technology (CRLT) and Department of Instructional Technologies (IST) have received several NSF grants focused on building teachers' AI competencies and augmenting classroom learning experiences.

Exploring a combination of computational thinking and ethical reasoning around AI creates opportunities to understand when and how in the learning process opportunities arise for a diverse range of students to experience computer science disciplinary ideas as personally, culturally and socially relevant. This is significant as little work has explored how students can be introduced to AI in ways that build technical competence while

having an ethical focus. IU faculty are currently developing introductory AI progressions that can be done most effectively and equitably when embedded in opportunities for students to reason about ethical issues meaningful to them.

Additionally, IU has found there is tremendous potential to augment teacher performance with AI resources. Learning analytic techniques enable the creation of computational models from large educational datasets for mining complex relationships between variables about teaching and learning. Intelligent assistants can leverage state-of-the-art learning analytic techniques to drive real-time guidance for teachers' classroom orchestration practices. Over the past several years, learning analytics have been used to predict student performance, model affect and engagement, capture collaboration processes and drive personalized learning systems across a range of educational subjects and settings. Learning analytics have also been utilized to drive teacher dashboards that summarize students' aggregate performance to inform teacher decision-making and pedagogical practices.

**Texas A&M University**

The literacy.io suite of web-based intelligent tutoring systems, with the support of trained highly effective teachers, fosters the development of skills that prepare students to be informed, thoughtful and productive global citizens. Specifically, the literacy.io suite encourages student perseverance in complex tasks, self-regulation (self-management, goal-setting, peer collaboration, and motivation), empathy for others, exploration of identity and positive engagement in learning and society. The lessons reduce cognitive load and increase engagement and motivation through the consistent application of evidence-based reading and writing strategies with all the necessary background knowledge to scaffold learning.

Efficacy studies on the reading comprehension (i.e., ITSS, SWELL) and writing (i.e., We Write) systems presented powerful evidence about the efficacy of these tools in improving learning outcomes on standardized and researcher designed measures[1]. The most recent generation of the ITSS, SWELL, and Massively Open Online Virtual (MOOV) software tools are resulting in 100 percent pass rates on the State of Texas Assessment of Academic Readiness (STAAR) in schools implementing the strategies with fidelity. Additionally, a current implementation of the ITSS and SWELL tools, supported by teachers trained on the MOOV platform, has shown steady and marked increases in student outcomes on reading at grades K through 5. Student attitudes towards reading, engagement in learning and attitude towards others continue to show steady improvements despite the pandemic related challenges.

This suite of products is now further enhanced with social emotional learning focused strategies and reading materials and writing prompts specifically selected to improve empathy, identity and positive engagement with learning. Specifically, they focus on goal setting, perseverance in and self-regulation of complex tasks, culturally relevant reading materials and activities to enhance identity-based motivation, encouraging empathy for others and promoting positive engagement with learning, society and global citizenship.

**University of Florida**

At the University of Florida, artificial intelligence (AI) serves as the centerpiece of a major, long-term initiative capitalizing on its world-class research infrastructure, leading-edge research activities and transformational approach to curriculum. Its depth is making the university a leader in AI research and

[1] Bogaerds-Hazenberg et al., 2020; Wijekumar et al., 2012; Wijekumar et al., 2014; Wijekumar et al, 2017; Graham et al., 2018; Sahni et al., 2021

development; its breadth will make sure every UF student develops a basic competency in AI regardless of their field of study. The University of Florida (UF) launched in 2019 a comprehensive initiative to incorporate AI curriculum in all 16 colleges and across all disciplines taught at UF. This Fall new AI certificate courses will be offered broadly to undergraduates and required of all entering freshmen in our business school. The initiative secured state funding to hire 100 new faculty in AI and to support the creation of a Data Science building that houses UF's state-of-the-art NVIDIA AI supercomputer. To broaden the reach of their AI workforce development and research initiatives, UF developed MOUs with the 12 Florida State University System campuses and the schools with the SEC footprint, to share AI computational resources and course curriculum at no added cost.

UF's inclusive approach — supported by private industry, state government and federal agencies, institutes, and foundations — is reflected in the work taking place at the University of Florida's College of Education. Researchers in the College of Education are using advanced educational technologies, learning analytics and machine learning to develop data-driven solutions to dramatically improve learning outcomes for all K-12 students, with a particular focus on children with diverse learning needs and who have experienced pandemic-related learning losses. They are identifying new as well as existing and persistent learning barriers and developing instructional strategies, learning processes and innovative technologies that provide much needed bridges to help all children succeed academically.

Specific research projects in the College of Education include examining how students engage in online spaces to inform instructional design and delivery, machine learning to keep students participating in online education motivated, lessons learned--especially about the digital divide--from the move to emergency remote learning in the pandemic and identifying and addressing learning outcome shortfalls through large-scale learning management system data analysis.

**University of Minnesota**

The College of Education + Human Development of the University of Minnesota established the Learning Informatics Laboratory (LIL) in 2017 with faculty members from across the college, specifically in the departments of Educational Psychology and Curriculum and Instruction to better align collegiate expertise in computational learning and applications. They have expanded these early efforts by including faculty members in Computer Science & Engineering from multiple institutions, investing in the infrastructure needed to advance research in the present and future state. Through the LIL, they are engaged with Infinite Campus (IC) to give researchers access to their vast student information systems database, to advance collective understandings of student success and to improve future product deliverables of the IC.

**Vanderbilt University**

The Learning Incubator: A Vanderbilt Endeavor (LIVE) combines scholars, who understand learning across many contexts, with computer scientists and engineers, who design advanced technologies to re-imagine traditional practices. Consequently, LIVE emphasizes partnerships that leverage nascent technologies to problem-solve future-of-work and future-of-learning problems. In the education world, this includes creating compelling virtual worlds and digital stories that are immersive while still connected to the real world.

In addition to LIVE, Vanderbilt University has received $4.15 million from the new $20 million NSF AI Institute for Engaged Learning to help develop narrative-centered AI platforms and characters to interact with and support a wide variety of learners.

Thank you for both of your attention to the work for LEARN members in this important area. Should you wish to follow up on this information, please contact Alex Nock at anock@pennhillgroup.com

Best Regards,

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