

How can AI leverage data for better understanding of Student Mental Health and address its impact on Learning Needs?



PROBLEM OF
PRACTICE

Mental health concerns are rising at an unprecedented speed. Research reveals that an alarming 20% of youth experience a mental illness, with 50% starting to experience symptoms by the early age of 14 ([CMHA, 2025](#); [APA, 2022](#)). Our project examines the following question: how might we leverage AI and machine learning to analyze student data to better understand and meet the mental health and learning needs of students?

In an increasingly digital world, challenges have emerged in schools that hinder both staff and student well-being, and in turn, student learning outcomes. Research indicates rising incidences of ADHD, violence, mental health issues, and diagnosed conditions like anxiety and depression among students ([WHO, 2024](#); [Anderson et al., 2024](#)). Simultaneously, school staff are grappling with increasing workloads, staffing shortages, and resource constraints, leading to higher rates of educator burnout and lower student success ([Oberle & Schonert-Reichl, 2016](#)). Given the growing complexities of both the educational environment and the learners themselves, it is evident that a “one-size-fits-all” approach to learning is insufficient, and lesson plans must be adapted accordingly to ensure future success for all students, not only academically, but mentally and socially as well.

Most schools have insufficient personalized data and/or resources to support student mental health and learning, and when student needs aren’t met, this often leads to chronic stress and mental illness ([Deng et al., 2022](#); [Durlak et. al., 2011](#)). This project aims to ensure school staff are better equipped to meet unique learners’ needs.



Organization: **Headwater Learning Foundation**

Province: Alberta

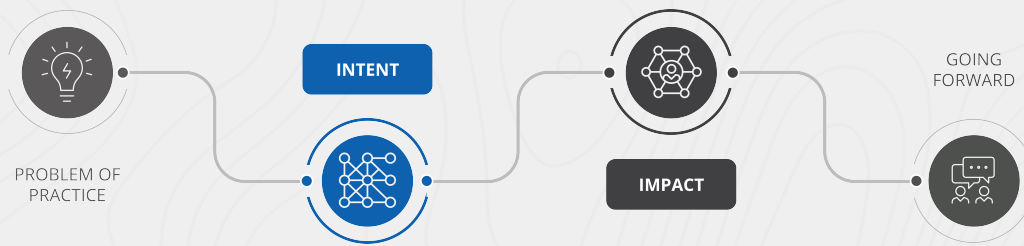
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Intent

This use case demonstrates how AI and data can be utilized to understand and address students' unique learning and mental health needs while also easing the burden on educators by reducing workload and improving efficiency. Phase 1 of this project focuses on a K-12 school initiative that supports neurodiverse learners by leveraging traditional data and generative AI to better understand and respond to students' individual needs. The goal is to manually assess students' psychoeducational profiles—covering their learning, cognitive, mental health, and social-emotional needs—and transform this data into actionable insights that enable teachers to design lesson plans and classroom settings tailored to their students' diverse needs. In Phase 2, machine learning will then be used to assist with the generation of additional patterns and precision learning tools that were not captured using human-derived data.

// A “Human-in-the-Loop” Approach is key to better understanding and addressing the needs of neurodiverse students and school staff. It is evident from our work that using AI to complement rather than supplant human-derived analysis is able to uncover patterns and correlations that were not previously considered when using solely human-derived analysis. Leveraging this symbiotic relationship between machine learning and human learning and cognition leads to better learning, cognitive, mental health, and social-emotional outcomes in students when used appropriately. //

—Dr. Gina Cherkowski, Executive Director of Research and Development



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Impact

In Phase 1, which initially involved human-derived analysis of student data, several findings were generated that helped to better understand diverse students' mental health, social-emotional, and learning needs. Given that this manual analysis was so tedious, AI will play a key role in Phase 2 to make the process more efficient.

Key early findings from Phase 1 include:

- Anxiety is co-morbid with ADHD-inattentive and ADHD-combined types more-so than with ADHD-hyperactive. Possible reasons are that the body is releasing stress physically through movement, and also the teacher is more likely to provide interventions for students who are moving around, fiddling, and or noticeably not able to pay attention in class.
- Anxiety seems to be associated with performance overall.
- Students diagnosed with an early math learning disability are more likely to have prescriptions for anxiety and depression over the course of their lifetime and into adulthood. That said, we are examining these patterns early on in childhood so we can support the• Anxiety is co-morbid with ADHD-inattentive and ADHD-combined types more-so than with ADHD-hyperactive. Possible reasons are that the body is releasing stress physically through movement, and also the teacher is more likely to provide interventions for students who are moving around, fiddling, and or noticeably not able to pay attention in class.
- Anxiety seems to be associated with performance overall.
- Students diagnosed with an early math learning disability are more likely to have prescriptions for anxiety and depression over the course of their lifetime and into adulthood. That said, we are examining these patterns early on in childhood so we can support their learning outcomes and change their trajectory into adulthood.
- Dyslexia and reading disorders are highly correlated and co-morbid with anxiety.

The mental health insights and patterns gathered from Phase 1 data analysis have been used to explore how generative AI can help develop specific and tailored tools to support school staff—especially educators. These tools can be used to offer suggestions and prompts to help teachers design lesson plans, classroom activities, and engagement strategies that are grounded in evidence-based mental health practices.

For example, our work shows that teachers could benefit from using prompts like:

- *"What quick breathing or grounding practice can be used before a test or presentation to calm anxious students?"*
- *"What are some examples of activities that I can incorporate into a grade five math lesson that includes emotional regulation strategies."*
- *"Design a group activity for high school students that supports social connection and reduces anxiety."*
- *"Suggest daily brain breaks that I can include in my classroom routine."*
- *"What are some strategies to engage neurodiverse students who have ADHD-inattentive and anxiety?"*

These kinds of prompts will enable educators to proactively support the well-being of all students, including those who are neurodiverse, while still meeting curriculum goals—essentially embedding wellness into everyday teaching.

All of these early findings and patterns identified in Phase 1 via traditional analysis methods (e.g., the link between early math disabilities and depression) will be further explored using AI analysis methods in Phase 2 to uncover further trends.

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Impact

Professional Learning insights

What worked well?

- We have a nuanced picture of every learner in the school, including their cognitive, mental health, social-emotional, and learning profiles.
- We have a very detailed understanding of the cognitive, mental health, social-emotional, and learning profiles of a classroom as a whole.
- We have a deep understanding of who is in the school building as a whole, which helps us better understand and connect to our community, meet the community's needs, and create a culture of care both inside and outside the school.

- We better understand what our teachers need to know in order to meet the diverse needs of students in their classrooms (nuanced and responsive - in the moment - professional development).

What could be improved?

- The dataset was too large for the human eye to analyze (which is why we need to leverage AI / machine learning in the next phase).
- We were not able to think about all of the patterns or queries that would result from the data and show us what our complex learners need.
- We were unfamiliar with how to keep the data safe, where to store it, and who can manage it. Thus, further professional learning and training on data security will need to be implemented to ensure student data is secure.

Although we did not analyze student datasets using machine learning in Phase 1, foundational literature was explored in this phase in Phase 2 to get a better understanding of AI and how to use it appropriately; frameworks such as the Human-in-the-Loop approach (HITL), the PROMPT Recipe, CHECK AI Framework, BIAS Identification Framework, K-12 Standards for AI in Education, The Five Big Ideas Framework, were researched to better support this AI Use Case and its future directions ([Meng, 2023](#); [TechEd Maven Consulting, Mitchell, & Chana, 2023](#); [AI4K12.org, 2020](#)).

A "Human-in-the-Loop" Approach is key to better understanding and addressing the needs of neurodiverse students and school staff. It is evident from our work that using AI to complement rather than supplant human-derived analysis is able to uncover patterns and correlations that were not previously considered when using solely human-derived analysis. Leveraging this symbiotic relationship between machine learning and human learning and cognition leads to better learning, cognitive, mental health, and social-emotional outcomes in students when used appropriately.



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Going Forward

GOING
FORWARD



Moving forward in Phase 2, we will collect and analyze data using both human intelligence and AI to first 1) learn more about the trends outlined in our early findings to better support students in school, and 2) continue to customize and trial lesson plans to improve and optimize learning and mental health outcomes of students and staff.

In Phase 2, we will also aim to better understand the needs of various school staff (educators, administrators, leaders, etc.) and then look into unique ways we can leverage AI to reduce their specific workloads, stress levels, and rates of burnout.

We will identify the specific roles needed in schools to account for this evolving shift. For instance, from our data and this use case, we feel an AI data analyst is an advantage that will help schools understand and use their data to support learning, social-emotional, and mental health outcomes with greater precision.

We noted that professional development training for all relevant school staff is important to better understand limitations and cautions of AI, such as plagiarism, bias, and cyber safety, the cautions of using standardized lesson plans for all students, etc.

We have appointed a data scientist to assist with AI analysis and machine learning. Up to this point, analysis has been time consuming and tedious. Analysis has also been limited by our own curiosities or concepts that we want to explore (e.g., ADHD and anxiety). With the use of generative AI and machine learning to continue our analysis in the next phase, unexpected or unforeseen patterns will emerge, giving us better insight into what neurodiverse students require to thrive (academically, socially, and emotionally).



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