

## **Artificial Intelligence meets Education: Defining the Future of Course Predictions**

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### **Abstract**

In education, one of the greatest setbacks faced by students is failure, the inability to pass a course and successfully receive credit. As a means to help curb this issue, artificial intelligence technology has emerged as a way to understand the performance of students throughout previous and current courses as well as what they struggle on or excel at, allowing for a better window into the risk of failure in certain educational scenarios. Indeed, AI's usage in the educational system is a promising way of telling whether a student is at risk of failure in a course that could be on the way to provide ways of improvement to students who might otherwise fail.

Keywords: education, artificial intelligence, predictions, risk, failure.

A.I. (Artificial Intelligence) is the ability for a computer to be able to do intelligent activities similar to a human. A.I. has been around since the 1950's. It all started when an article was published by Alan Turing in 1950(A. M. Turing (1950) Computing Machinery and Intelligence. *Mind* 49: 433-460. ). It talked about the basis of computer learning and the idea of it having a conscience. Alan Turing was ahead of his time, however, and due to this he was never able to foresee an A.I. as complex as he imagined. However, since the 2000s, his ideas are starting to come to life and A.I. is slowly forming into an implementable idea in today's society. While A.I. has opened humanity up to a new era similar to the industrial revolution, it has not come without its controversies. Controversy is normal with newer ideas, as they have not been regulated due to the earliness of its use. When cars were first implemented in society there were no seatbelts or traffic signs or any safety precaution whatsoever. With time, however, people started to see problems with the raw car and started adding and restricting aspects to it.

We believe A.I. has a ton of potential just like the rest of the world. We believe it can fit into the modern learning curriculum with a few adjustments, like a seatbelt with the car. Many kids from low income communities don't have the monetary assets to afford a tutor. So we propose the creation of an A.I. that tests the needs of the kid and stores it somewhere. We will base it off of free platforms such as Khan Academy, but students' questions and needs will be addressed by the A.I.. This program will essentially be youtube google and Khan Academy combined into an A.I. program.

In education, one of the greatest setbacks faced by students is failure, the inability to pass a course and successfully receive credit. When students fail, it is very likely that preventative measures could've helped in avoiding the occurrence and that this could be detected ahead of time. However, a teacher can't address all of these problems at once. AI, however can; Through AI, students can receive the necessary aid they need to prevent it. Not only would this save the student time and money, but also further their educational goals and provide them with resources available if they are struggling and at risk of failure.

Through the careful consideration of sources, we found multiple sources which directed us to the idea that machine learning can detect when a student is on track to fail, such as the article Pre-course Prediction of At-risk Calculus students by Cunningham et al.

Multiple studies have explored the possibility of providing ways of improvement to students by using AI technology to infer where they may lack, and therefore what interventions they may need the most. Other studies focus on KT, or knowledge tracing, allowing for the tracking of what students are well versed in and vice versa, through the use of neural networks, such as the study by Geoffrey Converse, Shi Pu, and Suely Oliveira titled "Incorporating Item Response Theory into Knowledge Tracing." Using this data, A.I. could be used to determine the strengths and what students are lacking in, as a way to provide ample support for where students need it the most. There are many variables which can be introduced to the prevention of failure in classes, which is something that a study titled "Predicting Success, Preventing Failure" by Danny Glick, Anat Cohen, Eitan Festinger, Di Xu, Qiuji Li and Mark Warschauer dives into by introducing an experiment which factors in not only fitness but also behavioral qualities in asynchronous classes, finding that disciplined effort could help in prediction of class outcomes and other factors such as the student's beliefs

about peer learning. Additionally, ethical questions also arise during the use of A.I. to distribute support to students.

The research could be extended in the future to predict students' long-term academic standing rather than their standing in a single class. Using the data from multiple cumulative courses and other factors over time can help educators better support students over their whole learning career rather than a single class. Artificial intelligence models, especially those based off of real life data, are at a high risk of containing vast biases. These models may be unfair to certain demographics or types of students that lack enough data to accurately predict. Future research can develop and extend ways to mitigate potential biases and confirm fairness in the implementation. Future models could benefit from growing AI research.

Things like refining algorithms and adopting new techniques could be used to enhance the accuracy of models that predict student failure and ways to help them. There is great potential for Artificial Intelligence to aid educators in identifying students who are struggling or at risk of failing a course. These AI systems analyze information from various sources such as placement tests, surveys, and student information systems, the systems can then utilize this data to provide insight into students' areas of strength and weakness. Ultimately this information can be used to develop interventions and other support mechanisms to help students who are struggling and improve their chances of success in those areas.

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