

AI in Education

In this Information Age, it is evident that computing has a powerful impact on various domains. National lockdowns and the subsequent prevalence of e-learning have exemplified the necessity of computational tools for increased access to education. These tools can go further than merely increasing access to education, however; they can vastly improve the way that educational information as we know it is delivered. Artificial intelligence, in particular, enables the delivery and access of information in a way that has been prohibitively expensive and time-consuming in the past. From providing administrative support to teachers and professors, to providing adaptive learning for the individual student, it is clear that artificial intelligence provides new and impactful improvements to the educational system. This paper will examine the leading companies providing novel advancements in AI educational technology, and will compare the services that they provide to teachers and learners.

One of the major companies in the AI edtech field is Squirrel AI, the first and largest intelligent adaptive education provider in China [1]. Squirrel AI works by partitioning educational information into numerous smaller knowledge components which form a knowledge graph. Then, the company's adaptive learning engine, Intelligent Adaptive Learning System (IALS) utilizes numerous AI algorithms to customize the student's learning based on their individual "user persona" and initial knowledge assessment [1]. As the student learns, the system collects more data about their learning style and identifies the areas on the knowledge graph that the student needs to work on. In this way, the system provides a "supervised adaptive learning experience" that is customized to each student [1]. A system like this saves valuable time, as it assesses the student's learning and adapts so that the student can focus on their gaps in knowledge as opposed to spending time on already acquired knowledge.

Another company which similarly provides a customized learning experience to the student is Century Tech. Century Tech, based in England, "combines learning science, AI, and neuroscience" to provide a personalized learning experience to each student [2]. Century Tech offers support for English, math, and science courses in grades K-12, and unlike Squirrel AI, it also offers support for college-level courses and further adult education. Century Tech's learning system works by first having the student complete diagnostic assessments, and then the recommendation engine provides the student with a specific learning pathway based on their results. This provides the student with a personalized learning experience, which, coupled with

automatic grading of assignments, allows the student to more efficiently gain knowledge. This system improves efficiency for the teacher as well, as they are able to spend less time on grading assignments and more time on lesson planning. The system provides the teacher with a wealth of useful information on each student, such as what specific answers they gave and how long the assignment took the student to complete [2]. Additionally, the teacher can use a dashboard view of the entire class, as well as a dashboard of each individual student, to track the progress of the students on multiple levels. In this way, Century Tech saves time on administrative tasks and provides a personalized education for each student.

Another company that is optimizing AI for edtech is Cognii. Cognii is unique because it offers a Cognii Virtual Learning Assistant (VLA) that is specialized for academic discussion. Whereas other edtech systems focus on multiple choice questions, the Cognii learning platform uses proprietary Natural Language Processing techniques to immediately assess students' free response short answers and provide feedback. The deep NLP techniques used by the Cognii Assessment Engine evaluate not just the syntax and semantics, but also the concept hierarchy present in the student's response [3]. Cognii claims that their platform "was found to be 96% as accurate as humans in evaluating short essays" [3]. This has enormous potential in aiding students, as they will be able to get instant essay feedback at any time, which is not possible with a traditional school environment. In addition to providing this useful tool to students, Cognii provides a dashboard for educators to examine real-time student data at both a class-wide and individual level [3].

A notable leading edtech company is Carnegie Learning, which won the 2020 EdTech Award for "best artificial intelligence solution" for its MATHia adaptive learning software [4]. MATHia is unique because it focuses on providing individual, personalized math tutoring to students in grades 6 through 12. MATHia keeps students engaged by providing "sophisticated AI technology to adapt at a very detailed, skill-by-skill level" [5]. In this way, it provides customized feedback to help each individual student progress at their own pace. Receiving this kind of immediate, individualized feedback would otherwise be difficult for a student to acquire in a traditional e-learning environment.

Another unique platform that is used in edtech is Blippbuilder by Blippar. Blippbuilder provides tools for students and educators to create augmented reality learning experiences in the classroom. For example, a teacher would be able to create a 3D model to assist students'

visualization of a concept in a science class. Blippar believes that using such augmented reality tools will aid in “bringing extra creativity, interactivity and engagement to any subject” [6]. Such a tool could greatly assist teacher instruction in concepts that are difficult to visualize.

There are numerous companies utilizing AI in edtech to provide students and teachers with a vastly improved educational experience. These companies provide smart assistance in virtually every area of education, from AI tutoring chatbots to virtual learning environments for the classroom. It is clear that AI offers vast opportunities for improving the educational system through unparalleled personalization, automatic feedback, and 24/7 tutoring assistance. Companies like Squirrel AI, Century Tech, Cognii, Carnegie Learning, and Blippar are at the forefront of delivering such learning opportunities to students and teachers everywhere.

References

- [1] “Intelligent Adaptive Learning System (IALS),” *Squirrel Ai Learning*. [Online]. Available: <http://squirrelai.com/product/ials>. [Accessed: 01-Nov-2021].
- [2] “Online learning: English, Maths and science,” *CENTURY*. [Online]. Available: <https://www.century.tech/>. [Accessed: 01-Nov-2021].
- [3] “Technology,” *Cognii*. [Online]. Available: <https://www.cognii.com/technology>. [Accessed: 01-Nov-2021].
- [4] “Mathia® by Carnegie Learning Wins ‘Best Artificial Intelligence Solution’ in the edtech awards 2020,” *Business Wire*, 13-May-2020. [Online]. Available: <https://www.businesswire.com/news/home/20200513005646/en/MATHia%C2%AE-by-Carnegie-Learning-Wins-%E2%80%9CBest-Artificial-Intelligence-Solution%E2%80%9D-in-The-EdTech-Awards-2020>. [Accessed: 01-Nov-2021].
- [5] “Mathia,” Carnegie Learning. [Online]. Available: <https://www.carnegielearning.com/solutions/math/mathia/>. [Accessed: 01-Nov-2021].
- [6] Blippar, “Augmented reality in education: Create ar,” *Blippar*. [Online]. Available: <https://www.blippar.com/build-ar/augmented-reality-education>. [Accessed: 01-Nov-2021].