Transforming Education with edYOU Conversational AI: A Case Study of Sierra Canyon School

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ABSTRACT

This paper explores and summarizes the implementation and impact of Nova edYOU's Conversational AI Being™ Tutor at Sierra Canyon School, aimed at enhancing the educational experience by providing round-the-clock support and personalized instruction. The study employed a mixed-methods approach, analyzing quantitative data from academic performance metrics and qualitative data from surveys and interviews with students and educators. Findings revealed significant improvements in student grades, particularly in Biology and Pre-Algebra, and increased engagement correlated with higher login times among top performers. Students and educators reported high satisfaction levels, highlighting Nova's effectiveness in explaining complex concepts and supporting learning outside the classroom. Despite challenges such as initial resistance from educators and technical integration issues, the implementation of Nova demonstrated the transformative potential of conversational AI in education. Future research should explore the long-term impacts of AI tutors, their scalability across various educational settings, and the enhancement of AI capabilities to support a broader range of subjects. This study provides valuable insights into the practical applications of AI in education, underscoring its capacity to enhance traditional teaching methods and foster innovative learning environments.

INTRODUCTION

Integrating AI in educational settings has shown promising results in improving student engagement and personalized feedback (Chan & Zary, 2019; Gorby, 2001; Sanchez-Gonzalez & Terrell, 2023; Varma et al., 2023). AI technologies, such as chat bots, are being increasingly adopted to supplement traditional teaching methods. These technologies offer talk-like, pre-programmed answers, and provide real-time feedback, enhancing learning. Additionally, these can benefit teachers by automating administrative tasks, allowing them to focus more on instructional activities and student interaction.

Sierra Canyon School, known for its commitment to innovation in education, partnered with edYOU Technologies to introduce Nova, a 24/7 AI Being™ and teacher's assistant, also known as a Personal Learning Assistant. This initiative aims to leverage conversational AI to enhance the educational experience for students and support teachers in their instructional roles. The integration of Nova represents a significant step towards modernizing the educational environment at Sierra Canyon School, providing students with round-the-clock access to academic support and wellness support, fostering a more engaging and effective learning experience.

Accordingly, the primary objective of this white paper is to detail the implementation process, assess the initial outcomes, and analyze the impact of Nova on student engagement and learning. In addition, the results of the successful implementation of edYOU technologies and the future implications of integrating conversational AI through the edYOU patented platform in education and wellness are included in the present article.

Students interacted with Nova through their devices and in a classroom setting, enabling them to receive instant feedback, clarification of concepts, and additional practice problems. Teachers and students were encouraged to use Nova to automate routine tasks, such as grading and providing feedback on assignments, allowing them to focus on more personalized instruction.

METHODS

Study Design: The study employed a mixed-methods approach, combining quantitative data from academic performance metrics and qualitative data from surveys and interviews with students and educators. Through a pilot study involving 250 students from grades 6-9, covering subjects such as Pre-Algebra and Biology. The study spanned an academic semester to capture comprehensive data. Data was collected through pre- and post-study surveys, academic performance records, and feedback sessions. Surveys measured student engagement, satisfaction, and perceived effectiveness of Nova. Interviews with educators provided insights into Nova's impact on teaching practices and classroom dynamics.

Educational Outcomes: Key metrics included changes in student engagement levels, improvements in academic performance, and user satisfaction ratings. Engagement was assessed through attendance records and participation in class activities. Academic performance was measured using test scores and grades, while satisfaction was gauged through survey responses.

Implementation of Nova: In collaboration with edYOU Technologies, Sierra Canyon School launched Nova, the Conversational AI Being™ Tutor. This AI-powered tutor was integrated into the curriculum to assist students with their studies around the clock and support teachers in managing classroom activities and providing personalized instruction. Subjects such as Pre-Algebra and Biology were selected to evaluate Nova's effectiveness across different academic disciplines. The study aimed to understand Nova's capabilities in a real-world educational setting comprehensively.

Nova was seamlessly integrated into the school's digital learning platform. The AI learning experience was delivered by proprietary technologies designed to be personal, ethical, and educationally effective (Sanchez-Gonzalez & Terrell, 2023). Using the edYOU, patented personalized ingestion engine (PIE), the platform curates diverse learning materials from expert sources worldwide. A personalized AI (PAI) then leverages natural language processing through wrapping and proprietary machine learning to tailor customized conversations to each student's current knowledge. In addition, an intelligent curation engine ensures that the AI interacts safely using techniques like content flagging, toxicity blocking, and data verification. This combination enables AI tutors on the platform to build long-term mentoring relationships by adapting to each learner's evolving needs.

RESULTS

Initial Feedback

Student Perspectives: Sierra Canyon students reported high satisfaction levels with Nova, appreciating its availability and responsiveness. They highlighted Nova's ability to explain complex concepts in an easy-to-understand manner, making it a practical study companion. Specific feedback included:

- "edYOU helps me to overcome the struggles I have while learning in the classroom."
- "edYOU helps me better learn materials that are confusing in class."
- "Now I can stay better motivated and excited in my schoolwork."
- "With edYOU, I can tackle problems step by step to better learn new material."
- "When I'm at home, edYOU is an easier study tool than a textbook."
- "edYOU helps me learn by giving personalized problems and examples in math."
- "Nova helps me break down concepts in a way that's easier for me to learn."

Educator Perspectives:

Teachers noted significant improvements in classroom management and student engagement. Nova's assistance in grading and providing feedback allowed teachers to allocate more time to interactive and personalized teaching. Educators also observed that students were more motivated and confident in their learning, often seeking help from Nova outside of regular school hours. Specific feedback from faculty included:

- "Sierra Canyon is happy to utilize edYOU, as this is the future of learning." - Head of Sierra Canyon School.

- "A powerful tool for remediation and helping kids close learning gaps. Having essentially a 'personal tutor' that can help you learn and adapt with you as you grow in math is an innovative idea."

SATISFACTION

Survey responses indicated high levels of satisfaction among students. Over 85% of students reported feeling more confident in their studies with the help of Nova. Educators noted that Nova's instant feedback and additional practice problems contributed to a deeper understanding and better retention of the material among students.

ENGAGEMENT

Data indicated a marked increase in student engagement. Attendance improved, and students participated more actively in class discussions and activities. Nova's interactive and conversational approach helped maintain student interest and motivation.

QUALITATIVE ANALYSIS

To gain deeper insights into the perceptions of students and educators regarding Nova, we conducted a qualitative analysis of the feedback collected through surveys and interviews. This analysis aimed to identify recurring themes and patterns that reflect the participants' experiences and attitudes towards Nova. By systematically coding the responses and categorizing them into themes, we highlighted the key factors contributing to Nova's effectiveness and acceptance in the educational environment. The following themes identified were identified and summarized in Table 1.

Motivation and Engagement and **Effective Learning Tools** emerged as the most frequently mentioned themes, each with a frequency of 7, indicating that students and educators highly value Nova's ability to motivate and engage students in their learning process. Additionally, the effectiveness of Nova as a learning tool is a critical factor contributing to its success and acceptance.

Ease of Use at Home and **Overcoming Struggles** both have a frequency of 6. These themes highlight the convenience and accessibility of Nova for students outside the classroom, allowing them to tackle challenges and overcome learning obstacles effectively. The emphasis on these aspects shows that Nova is seen as a supportive tool that helps students manage their study routines more efficiently.

Personalized learning has a frequency of 4, suggesting that while customized learning is an appreciated feature of Nova, it is relatively less highlighted than other themes.

Table 1. A summary of the major themes mentioned by students and educators.

Theme	**Frequency**
Overcoming Struggles	6
Personalized Learning	4
Motivation and Engagement	7
Ease of Use at Home	6
Effective Learning Tools	7

Learning Outcomes (Quizzes and Grades)

Students who spent more time with Nova generally had higher percentages of correct answers. For example, Student A had an 84.29% correct answer rate after engaging with Nova for over an hour. The overall improvement in academic performance was evident, with many students showing a significant increase in their test scores and overall grades and grades in subjects like Pre-Algebra and Biology (Table 2).

Table 2. Selected Improvement Summary with significant grade jumps success cases

Student #	Class	Semester 1 Grade Pre Intervention	Semester 2 Grade edYOU
#1	Biology	B-	A
#2	Pre-Algebra	B+	A
#3	Biology	B+	A-
#4	Biology	C	A-
#5	Biology	C+	B+

Figure 1: Grade Distribution – PRE Intervention vs. After edYOU

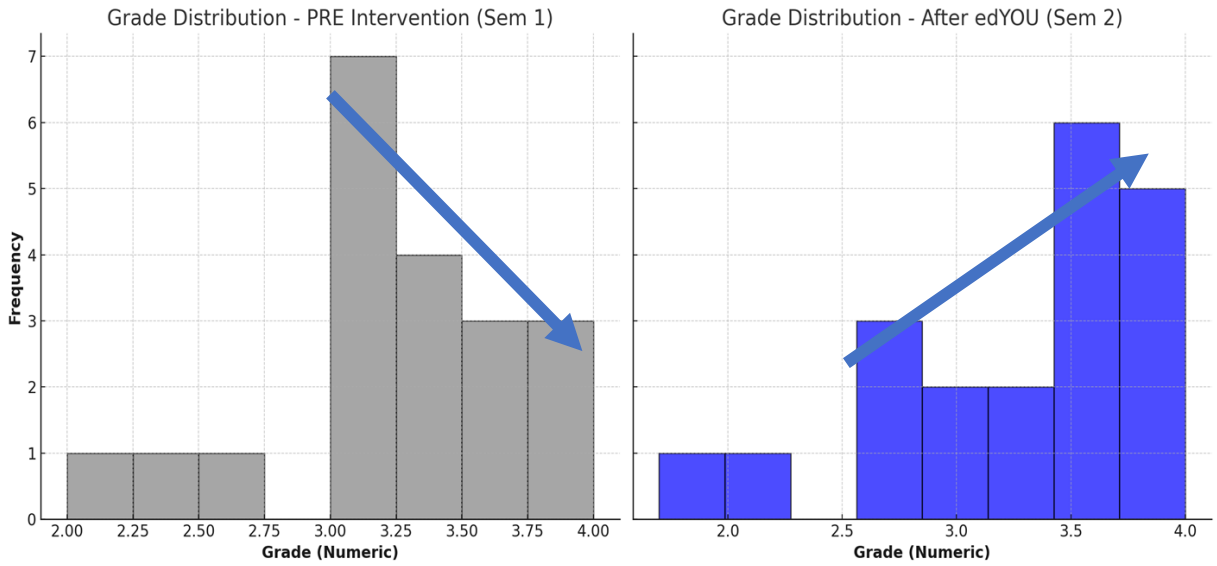


Figure 1 shows the grade distribution of students before and after the implementation of Nova, the AI tutor. The left histogram represents the grade distribution for the first semester (Pre-Intervention). In contrast, the right histogram represents the grade distribution for the second semester (Post-Intervention). Before the intervention, grades were primarily concentrated between 3.0 and 3.5, with the highest frequency of students scoring around 3.25 and fewer students achieving grades above 3.5 or below 2.75. After

the intervention, there is a noticeable shift in the distribution towards higher grades. Most students scored between 3.5 and 4.0, indicating a significant improvement in academic performance. The frequency of students achieving grades below 3.0 decreased, demonstrating an overall enhancement in student outcomes following the integration of the AI tutor. This trend suggests that the implementation of Nova positively impacted student learning, helping them achieve higher grades and improve their overall academic performance.

Figure 2: Overall Grade Changes Before vs. After edYOU

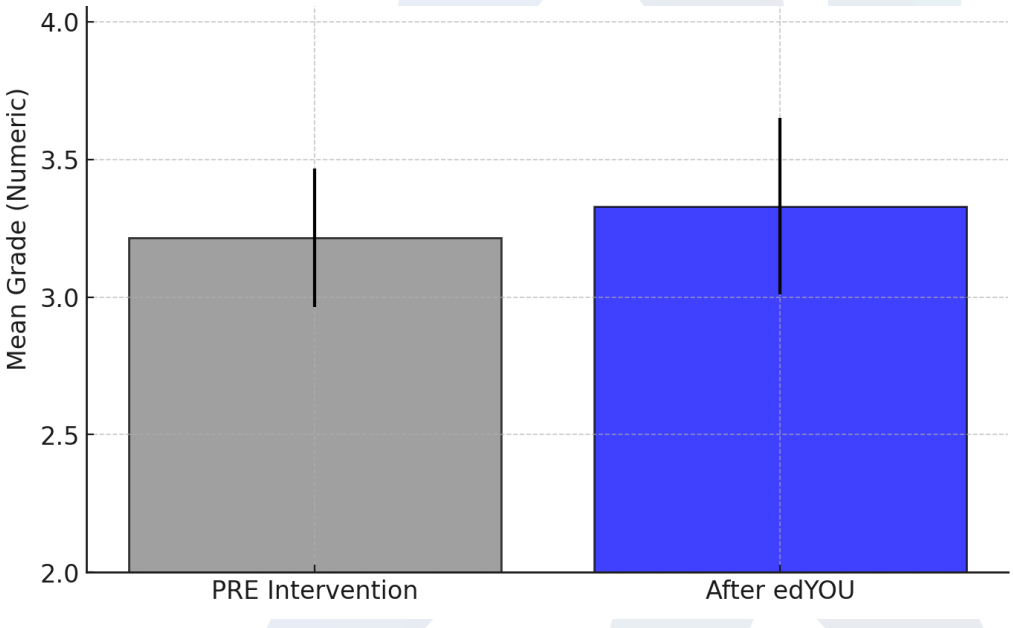
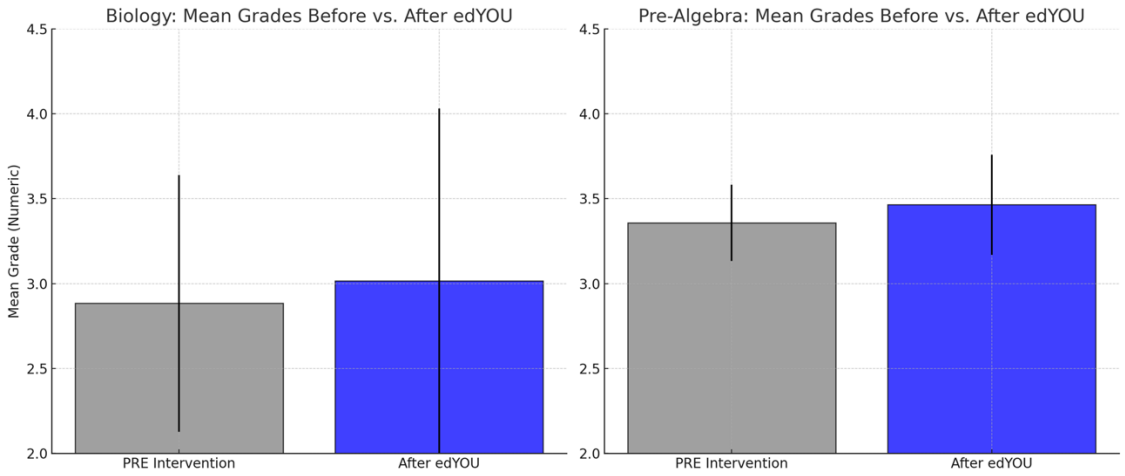


Figure 2 displays a noticeable increase in the mean grade after the intervention, indicating improved student performance. The increase in the mean grade post-intervention suggests that the use of Nova contributed positively to the student's academic outcomes.

Figure 3: Comparison of Mean Grades Before vs. After edYOU for Biology and Pre-Algebra



In Biology, the mean grade during the Pre-Intervention period (Semester 1) was noticeably lower than the mean grade during the Post-Intervention period (Semester 2). This improvement suggests that the integration of Nova positively impacted students' performance in Biology. Similarly, in Pre-Algebra, there was an observable increase in the mean grade after the implementation of Nova. The error bars, representing the standard deviation, indicated the variability in student grades. The reduction in the variability of grades post-intervention further suggested a more consistent improvement in student performance. Overall, results in Figure 3 demonstrate that Nova's use contributed to enhanced academic outcomes in Biology and Pre-Algebra, highlighting the effectiveness of AI-driven personalized tutoring in improving student learning and performance across different subjects.

Figure 4: PRE vs Post edYOU: Proportion of Students with Grade Changes

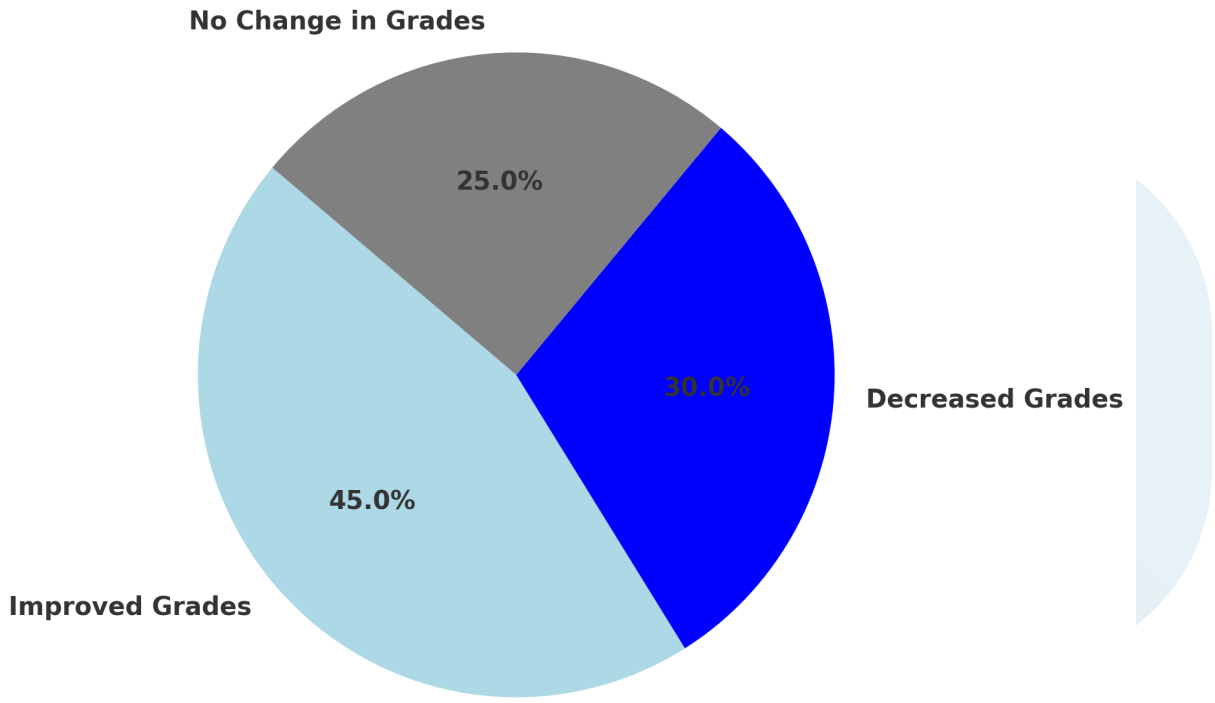


Figure 5: Proportion of Students with Grade Changes for Pre-Algebra

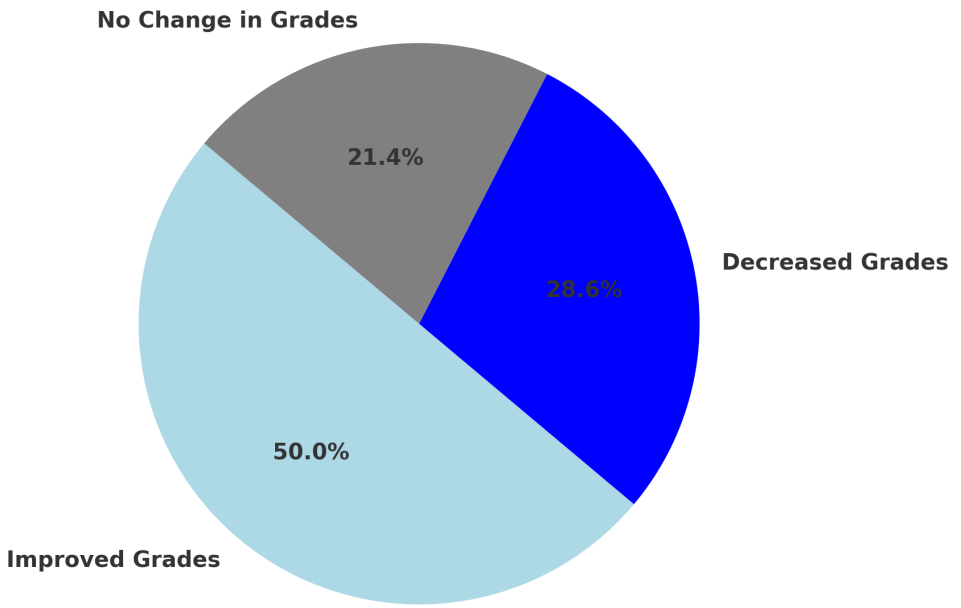


Figure 6. Login time interacting with the edYOU platform performers vs low performers.

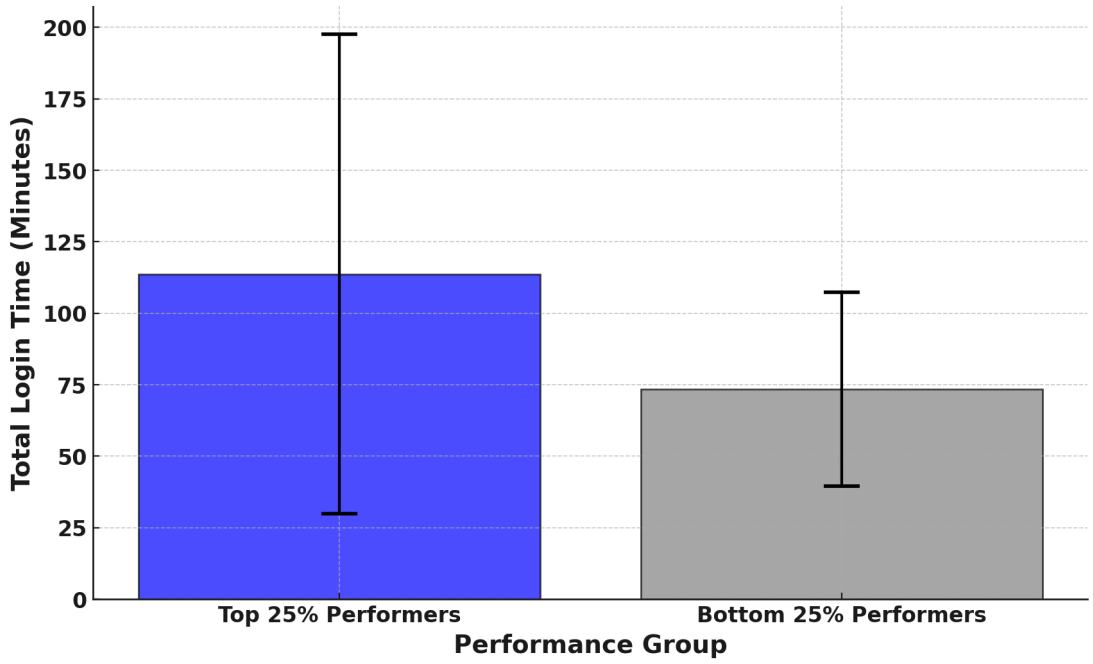


Figure 6 displays the total login time (in minutes) for the top 25% and bottom 25% of performers using Nova. The top 25% of performers had significantly higher total login times than the bottom 25%, suggesting that students interacting more with Nova tended to achieve higher performance outcomes. The higher login time among the top performers highlights the potential correlation between increased engagement with the AI tutor and improved academic performance. Academic performance showed noticeable improvement. Test scores and grades in pre-algebra and biology were significantly enhanced compared to previous semesters. The availability of instant feedback and additional practice problems contributed to better understanding and retention of the material.

DISCUSSION

This study aimed to evaluate the implementation and impact of Nova, an AI-powered tutor, on student engagement and learning outcomes at Sierra Canyon School. The main findings revealed that integrating Nova improved students' grades, particularly in Biology and Pre-Algebra. Furthermore, increased interaction with Nova was correlated with better academic performance, as indicated by the higher login times of top performers. These results suggest that conversational AI can effectively enhance the traditional educational model by providing personalized and accessible support, thus improving student engagement and learning outcomes. Integrating Nova at Sierra Canyon School has demonstrated the potential of conversational AI to transform the educational landscape. By providing personalized and accessible support, Nova has enhanced student engagement and learning outcomes, proving to be a valuable addition to the traditional academic model.

The findings indicate that AI-driven educational tools can significantly benefit academic performance and student satisfaction. Similar interventions using edYOU in the field of medical education have shown that AI can significantly improve learning outcomes and efficiency. For example, using AI in a flipped classroom has enhanced students' quiz scores and reduced the time required to learn complex subjects (Sanchez-Gonzalez & Terrell, 2023). Additionally, AI has effectively provided personalized learning experiences and supported curriculum integration in medical education (Chan & Zary, 2019). Prior studies and the results of the present study

highlight AI's broader applicability and potential to enhance educational experiences across various domains.

The implementation faced challenges such as initial resistance from some educators and

technical issues with integration. Addressing these challenges required ongoing training for teachers and continuous technical support. The study highlighted the importance of stakeholder buy-in and robust technical infrastructure for successful AI integration.

Future research could explore the long-term impacts of AI tutors on educational outcomes, the scalability of such technologies across different academic settings, and the potential for further enhancing AI capabilities to support a broader range of subjects and student needs.

CONCLUSIONS

The pilot study at Sierra Canyon School has shown that Nova, the Conversational AI Being™ Tutor from edYOU, significantly enhances student engagement and learning outcomes. edYOU has proven effective in modern education by providing round-the-clock support and aiding teachers in their instructional roles.

The successful implementation of Nova at Sierra Canyon School sets a precedent for other educational institutions to consider integrating AI technologies. As AI continues to evolve, its potential to revolutionize education and provide personalized learning experiences will only grow. This study provides valuable insights into the practical applications of AI in education, highlighting its capacity to support and enhance traditional teaching methods, ultimately paving the way for more innovative and adaptive learning environments.

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