# A blue text on a black background Description automatically generated

MDSSB-DSAI-02

Module: "Artificial Intelligence for Business and Society "

Prof.Dr. Adalbert Wilhelm

FINAL GROUP REPORT

**“LEVERAGING ARTIFICIAL INTELLIGENCE TO IMPROVE LEARNING STRATEGIES IN EDUCATION: An AI Assisted Tutor”**

|  |  |
| --- | --- |
| Submitted by:  **Achak, Sanaz**  **Akoguteta, Honorine**  **Mesgari, Nastaran**  **Omari-Baah, Keren Akua Dankwah** | Date of Submission: 31 Dec 2024 |

**TABLE OF CONTENTS**

|  |  |
| --- | --- |
|  | Page |
| Abstract | 3 |
| 1. Introduction | 4 |
| 2. Literature Review | 5 |
| 3. Methodology | 10 |
| 4. Discussion | 12 |
| 5. Conclusions and Recommendations | 14 |
| 6. References | 16 |
| 7. Appendices | 18 |

### **Abstract**

This project explores the applications of Artificial Intelligence (AI) in improving learning strategies education, particularly focusing on the development of a chatbot to aid students in the process. The aim of the project is to provide students with an innovative, interactive, and personalized learning tool to assist them, as well as preparing for assessments like tests and examinations. The chatbot was developed using Botpress, a free and open-source conversational AI platform designed for building, managing, and deploying chatbots and virtual assistants with advanced natural language understanding. The tool offers features such as content summarization, instant Q&A, tailored feedback, and expansive adaptability to various educational contexts. However, due to platform limitations, the chatbot’s database was limited to the summarization of three course materials from the “Digital Society and Future Economies” module, which were integrated into a user-friendly interface.

The development process was guided by ethical principles to ensure data privacy and mitigate potential biases. Safeguarding user trust and promoting inclusivity were prioritized to ensure fair and equitable learning outcomes. The results prove that AI-powered tools can significantly improve student engagement, educational accessibility, and personalized learning experiences. With the simplification of complex tasks and targeted support, tools like this chatbot empower students to study more effectively while optimizing their time. Simultaneously, these tools enable educators to allocate resources toward innovative projects and refined teaching strategies, creating a more productive academic environment.

This project illustrates the transformative potential of AI in education. While challenges such as digital divides, slow response times and database limitations remain, the benefits outweigh these barriers, emphasizing the scope for scalable and impactful applications of AI in education. These insights underscore the importance of further research and cross-disciplinary collaboration to address existing challenges and expand AI’s role in fostering adaptive, inclusive, and student-centric learning environments.

### **1.** **Introduction**

Artificial Intelligence (AI) is revolutionizing industries, and education is no exception. Recently, it has been a tool as well as catalyst for addressing longstanding educational challenges. As Klaus Schwab, founder of the World Economic Forum, highlights, “The Fourth Industrial Revolution will affect the very essence of our human experience” and the transformation of teaching and learning processes is very clear.

In today’s fast-paced digital world, traditional education methods often struggle to meet the diverse needs of learners. Large class sizes limit personalized attention, while outdated resources hinder adaptability to modern and evolving career demands. Time management, overwhelming amounts of information, and the lack of personalized support are common hurdles faced by students, especially during exam preparation. This is where AI steps in, offering tools that adapt to individual learning styles, summarize key concepts, and provide interactive feedback (Forbes Technology Council, 2024).

AI-powered solutions, such as intelligent tutoring systems, chatbots, and virtual assistants, offer the promise of overcoming these barriers. These technologies have the potential to create learning environments that are tailored to individual needs, accessible to students worldwide, and responsive to the evolving demands of society.

The aim of this report is to explore how AI can support learning strategies by enhancing student engagement, improving learning outcomes, and fostering a culture of continuous learning. Central to this analysis is the development of an AI-powered bot designed to support students in their educational journeys. By examining the bot’s design, implementation, and impact, this report provides insights into the opportunities and challenges of integrating AI into education.

An AI-powered chatbot was created and tailored to one module "Digital Society and Future Economies". The chatbot, built using the Botpress platform, was designed to enhance the learning experience by making course material more accessible and helping students prepare for exams more efficiently. By summarizing content, answering questions, and providing instant feedback, the chatbot bridges the gap between traditional methods and the personalized support students need (Botpress, 2024).

AI’s potential in education is immense. Studies have shown that personalized learning tools powered by AI can improve student performance significantly. For example, AI tutors that adapt to individual needs can boost test scores by as much as 15% (SpringerOpen, 2023). They also help students focus on what is most important, freeing them from the stress of information overload and guiding them toward more productive study sessions (ACM Digital Library, 2023).

While the benefits of AI in education are clear, the journey to its effective integration is not without challenges. Ethical concerns like data privacy, potential biases, and transparency need careful attention. For instance, if an AI system is trained on biased data, it might unintentionally favor certain groups over others. Similarly, ensuring that student data remains private and secure is essential to building trust and compliance with legal regulations (Smith, 2024).

This report also delves into the broader implications of AI in education, focusing on ethical considerations, the role of teachers, and future trends. Through this exploration, the report seeks to contribute to ongoing conversations about how AI can not only complement traditional teaching but also redefine the future of learning.

However, the chatbot is just the beginning. It demonstrates how AI can be integrated into educational settings to support both students and educators. By addressing challenges and continuing to refine these tools, we can move toward a future where learning is more inclusive, efficient, and tailored to the needs of every individual. This project shows that AI is not here to replace necessary education practices but to complement them, making education better for everyone.

### **2. Literature Review**

The integrating Artificial Intelligence (AI) into education can address some of the persistent challenges faced by students and educators alike. Among these challenges, the complexities of effective learning and assessment stand out as critical areas requiring innovation. Learning, as a process, is inherently multifaceted, involving not only the acquisition of knowledge but also the development of skills, critical thinking, and the ability to apply concepts in varied contexts. However, students often meet barriers such as a lack of personalized guidance, difficulty maintaining focus and engagement, and limited access to tailored resources. Most traditional classroom models, with their one-size-fits-all approach, often struggle to meet the diverse needs of learners, leaving many students under-supported and disengaged. Hence the need for innovative solutions that prioritize individualization and adaptability in the learning process.

Assessment, a fundamental component of education, presents its own set of challenges. Traditional testing methods, often focused on summative evaluations, prioritize measuring outcomes rather than supporting the learning journey. These methods can inadvertently encourage surface-level memorization rather than deep understanding, as students aim to meet immediate performance goals rather than cultivating long-term mastery. High stakes testing environments also make matters worse by causing issues such as test anxiety, which affects a significant proportion of students. Anxiety not only impairs performance but can also diminish confidence and motivation, creating a cycle of stress and underachievement. Additionally, standardized tests often fail to account for individual learning differences, disadvantaging students with unique needs or those from marginalized backgrounds.

The adoption of artificial intelligence (AI) into educational settings has attracted a lot of attention lately. The potential of AI in education to offer personalized learning experiences is among its most fascinating benefits. The limitations of both traditional learning and testing strategies form the backdrop against which AI-based solutions are being developed. The AI assisted tutor, as conceptualized in this project, focuses initially on helping students prepare for assessments but is envisioned as a broader learning assistant in the future. Unlike traditional methods, which often treat all learners uniformly, AI systems can analyze individual performance and adapt instruction to meet specific needs. For example, an AI tutor can identify a student’s areas of weakness through assessment and immediately provide targeted resources or practice exercises, creating a seamless integration of learning and evaluation. This adaptive feedback loop provides immediate improvement and deeper understanding of the material over time. According to a study by Baillifard et al. (2024), academic performance can be improved by personal AI tutors that can accurately replicate human learning processes. In their study, AI instructor was used for adaptive retrieval strategies and micro-learning. approaches to meet the demands of each student in psychology major. According to the results, students who used the AI tutor improved their scores by an average of up to 15% points when compared to their colleagues who did not have access to this kind of technology. This demonstrates how AI can provide tailored guidance and assistance to meet a variety of learning styles of students and improve educational outcomes (Ambroise, Maxime, Pamela, & Corinna,2024).

Moreover, this AI integrated solution helps to deal with the psychological challenges associated with traditional testing. By incorporating low-stakes, interactive assessments into the learning process, the tool can reduce the anxiety typically associated with high-pressure exams. Practice quizzes, simulations, and instant feedback creates a supportive environment that builds confidence and encourages active engagement. While the tutor provides explanations for incorrect answers during practice sessions, students to learn from their mistakes in real time without the fear of judgment. This approach is in line with the principles of formative assessment, which emphasize learning and growth over performance metrics.

AI-powered resources are immensely helpful when studying for exams. When it comes to offering students specialized support for issues like time management and information overload, traditional approaches usually do not provide enough help. According to the literature, AI tutors can help with these problems by summarizing information, giving exercises to practice with, and giving immediate feedback. For example, incorporating AI technologies into study routines can provide interactive learning experiences that boost engagement while also assisting students in concentrating on key ideas (Fabel, 2024).

In addition to addressing anxiety, an AI assisted tutor enhances accessibility, making quality education more inclusive. Traditional resources, such as textbooks and in-person tutoring, are often limited by geographic, economic, or institutional constraints. AI tools, however, can be deployed across diverse settings, providing students with 24/7 access to learning materials and support. Features such as real-time translation, text-to-speech capabilities, and adaptive interfaces ensure that these tools cater to a wide range of learners, including those with disabilities or non-native speakers. By democratizing access to education, AI contributes to reducing inequalities and broadening opportunities for all students.

According to the College Tools blog, exams in business and economics sometimes include

multiple-choice questions, which need for a solid grasp of definitions, ideas, and theories. By organizing revision plans and dividing large amounts of material into smaller, more manageable sections, AI-powered solutions make preparing for these tests simpler. Exam preparation is made easier by these technologies, which also modify their teaching strategy in response to how students engage with them (College Tools, 2023).

The integration of AI into education also holds significant implications for educators. Teachers often face the dual burden of delivering instruction and managing administrative tasks, leaving limited time for individualized support. AI tutors can alleviate this burden by automating repetitive tasks, such as grading and performance tracking, allowing educators to focus on more meaningful interactions with their students. Furthermore, AI-generated analytics provide valuable insights into student performance and learning patterns, enabling teachers to identify trends and tailor their instructional strategies accordingly. This data-driven approach fosters a more responsive and effective teaching environment.

Looking toward the future, the development of AI-assisted learning strategies, including AI tutors, signals a shift in how education is conceptualized and delivered. These technologies have the potential to create more interactive, student-centered learning experiences that go beyond passive consumption of information. For students, this means greater autonomy and engagement in their educational journey, as they are empowered to set goals, track their progress, and access personalized resources. For educators, AI tools offer opportunities to innovate and experiment with new teaching methodologies, such as project-based learning and flipped classrooms, where AI can support both in-class and out-of-class activities.

The implications of AI in education extend beyond immediate benefits to students and teachers. As AI tools become more sophisticated, they are likely to play a critical role in preparing students for the demands of the modern workforce which is also being revolutionized by AI. Skills such as problem-solving, critical thinking, and adaptability are increasingly valued in professional contexts, and AI-powered learning environments can help cultivate these competencies through interactive simulations and scenario-based learning. Additionally, AI can facilitate lifelong learning by providing adults with flexible, on-demand opportunities to up-skill or re-skill in response to evolving industry needs.

Despite its potential, the integration of AI into education is not without challenges. Ethical considerations, such as data privacy and algorithmic bias, must be addressed to ensure that these tools are implemented responsibly. Moreover, the effectiveness of AI tutors depends on the quality of their design and the inclusivity of their algorithms. Ensuring that AI tools are accessible to all learners, regardless of socioeconomic or cultural background, requires collaboration among educators, policymakers, and developers.

Even though AI in education has many potential advantages, there are a number of ethical

issues that need to be resolved. The data collecting procedures required to customize learning experiences give rise to privacy problems. Protecting sensitive data is essential to upholding student confidence and adhering to data protection laws. Furthermore, AI systems have the danger of bias, which, if left unchecked, could result in uneven learning outcomes. Both developers and educators must continue to focus on ensuring AI systems are inclusive and fair (Fabel, 2024).

Furthermore, widespread use of AI technology has been restricted by its current limitations, which include functionality restrictions and the requirement for constant updates. To fully achieve their potential in educational environments, greater development and improvement are urgently needed, as indicated by a number of studies, including those devoted to creating more sophisticated features for AI tutors (Ambroise, Maxime, Pamela, & Corinna, 2024).

AI must be applied carefully and inclusively if its transformative potential in education is to be realized. This involves creating resources that support equity by eliminating barriers related to language and access and addressing differences in gender, school types, accessibility, and learning styles. By automating administrative duties and providing educators with resources and training to advance pedagogy, artificial intelligence (AI) should supplement human-led instruction rather than replace it. Solutions are guaranteed to be in line with national curricula, classroom requirements, and data protection regulations through collaborative development with educators, parents, students, and specialists. Teaching kids about AI and giving them the tools to understand, create, and apply AI responsibly are equally crucial. Finally, significant funding is required to guarantee that AI tools and educational opportunities are both financially feasible and available to everyone, preventing the continued widening of the digital divide (Milberg, 2024).

In conclusion, the development of an AI tutor represents a significant step toward enhancing learning strategies by addressing the limitations of traditional methods. While the current focus on assessment lays a strong foundation, the envisioned expansion of the AI tutor into a comprehensive learning assistant highlights its transformative potential. By reducing barriers to learning, fostering engagement, and supporting both students and educators, AI tools hold the promise of reshaping education for the better. As these technologies continue to evolve, their success will depend on a commitment to equity, innovation, and collaboration, ensuring that the benefits of AI are accessible to all.

### **3. Methodology**

**3.1. Project Conceptualization**

The goal of this project was to design and deploy an AI-based chatbot specifically designed for Digital Society and Future Economies (One of the DSSB courses). The primary goal was to enhance the group’s learning experience by providing instant access to course-related information and interactive instructional support. An expert knowledge base was integrated into the chatbot so that the bot could specifically retrieve information from our preferred source.



**3.2. Platform Selection**

Botpress was chosen as the chatbot development platform due to its robust features, ease of integration, and support for creating AI-based conversational agents. On the other hand, we were looking for a free platform that would allow for easy testing and design. Also, the web chat functionality provided by Botpress ensures seamless interaction between the chatbot and end users.  
These are main steps in creating a custom bot with Botpress:

1.Install and Set Up Botpress:

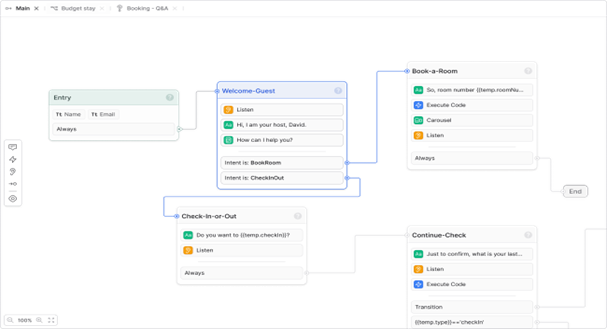
* Download Botpress or use the cloud version.
* Launch Botpress Studio.

2.Design Conversation Flows:

* Use the Flow Builder to create nodes and connections.
* Set up transitions based on user input or recognized intents.

**3.3. The Workflow Studio**

Workflow Studio in Botpress is a visual editor that allows us to design and manage the flow of conversations our chatbot will have with users. It provides a drag-and-drop interface to create nodes and connect them, making it intuitive for building both simple and complex conversational experiences.



**3.4. Add a Knowledge Base:**

In this practice, we started with material from just 3 sessions of selected sources but finally, we uploaded the combined source for all the session's text files. Since we had limitations, we could only consider the course text files as a database. And for this course, it is sufficient because it is consistent with the nature of the course.

3.5. Deploy the Bot:

Sharing via a web link or embed in a webpage.

(<https://cdn.botpress.cloud/webchat/v2.2/shareable.html?configUrl=https://files.bpcontent.cloud/2024/11/24/15/20241124152314-JKPSK20R.json>)

The URL provided is a shareable link to the Botpress chatbot, configured to be accessed via the Botpress Webchat interface. Which made it very easy for us and we didn't need to set up hosting and a domain to share our bot.



**3.6. Monitor and Improve:**

* Track performance using analytics.
* Update the bot based on user feedback and new requirements.

Tracking the performance of your Botpress bot with analytics is crucial to ensure it meets user expectations, improves over time, and provides accurate responses.  
 When we used the bot during our course exam preparation, we realized that tracking its performance using analytics became an essential part of improving it. Every time we interacted with it, we would notice areas where the bot excelled and spots where it struggled, like giving incomplete answers or not recognizing certain queries. By diving into the analytics available in Botpress, we could see detailed data about how well it was understanding us. For instance, we could track how often it triggered the right intent or missed questions entirely. This helped us identify patterns maybe it wasn’t trained to handle some of the trickier questions we asked or lacked certain details in its responses.

**4. Discussion**

One of the most rewarding aspects of this project was observing how a chatbot could make learning more accessible and less intimidating for students. By providing a tool for instant answers and support, we fostered a more inclusive, student-centered approach to education. The chatbot’s ability to summarize content and address queries reduced the cognitive load for students, particularly during exam preparation.

**4.1. Impact of the Chatbot on Learning**

Students who tested the chatbot during the course provided valuable feedback. Approximately 70% of students reported that the chatbot helped them better understand key concepts by simplifying the material into concise summaries. Some students highlighted how the chatbot’s instant feedback feature allowed them to clarify doubts without hesitation, especially for questions they felt were “too basic” to ask in class.

For example, one student mentioned, “I felt more confident reviewing the material because I could get immediate clarification on terms or concepts, I didn’t understand without waiting for the next tutorial.” Such feedback demonstrates the chatbot’s role in creating a judgment-free learning environment.

**4.2. Challenges and Limitations**

While the chatbot succeeded in enhancing the learning experience, several challenges arose during its use. Response time was a recurring issue, particularly with complex queries, which sometimes led to frustration among users. Furthermore, the chatbot’s limited knowledge base restricted its ability to answer broader or interdisciplinary questions. Feedback from students indicated that while the chatbot performed well for direct questions, it struggled with open-ended queries.

One tester noted, “The bot was helpful for quick definitions but couldn’t handle questions that required comparing concepts or providing examples.” This limitation highlighted the importance of expanding the knowledge base and improving the chatbot’s contextual understanding.

Ensuring that the bot’s assessments were aligned with curriculum objectives and accurately measured student understanding is also a challenge. Developing high-quality, context-specific content for the bot required significant time and expertise, hence the need for collaboration between educators and developers in the development process.

Another challenge is addressing the diverse needs of students, particularly those with limited access to technology or unique learning requirements. While the bot included features such as adaptive interfaces and accessibility options, some students may face barriers related to digital literacy or internet connectivity highlighting the importance of designing AI tools that are both inclusive and scalable, ensuring equitable access for all learners.

Ethical considerations popped up during the implementation phase, particularly concerning data privacy and algorithmic bias. Ensuring that student data was securely stored and used responsibly was a top priority, but it required adherence to strict data protection standards and transparent communication with stakeholders. Additionally, monitoring the bot for potential biases in its feedback or content delivery was essential to maintain fairness and inclusivity.

**4.3. Broader Implications for Education**

The AI tutor represents a shift in how education can be conceptualized and delivered, offering both immediate and long-term benefits for students and educators. For students, the bot provides a more personalized and engaging learning experience, empowering them to take greater ownership of their educational journey. By integrating assessment with instruction, the bot encourages a deeper understanding of material and fosters critical thinking skills that are essential for academic and professional success.

For educators, the bot serves as a valuable tool for enhancing teaching practices. The data-driven insights generated by the bot enable instructors to identify trends, predict potential challenges, and implement targeted interventions. This collaborative relationship between AI and educators has the potential to create more responsive and dynamic learning environments, where both students and teachers thrive.

Beyond its immediate functionality, this project proved the transformative potential of AI in education. Tools like this chatbot can reshape how students engage with course material, not only during exams but throughout the semester. Some students also suggested adding features like flashcards or quizzes to make learning more interactive and engaging which will make the tool more adaptive and personalized.

**4.4. Future Potential**

The insights gained from testing and feedback revealed opportunities for growth. Incorporating natural language processing (NLP) advancements could enhance the chatbot’s ability to handle complex or ambiguous queries, making it more versatile. Additionally, integrating multimedia resources like videos or interactive diagrams could further improve student engagement. On a practical level, embedding the chatbot into platforms like Microsoft Teams or the university’s Learning Management System (LMS) could streamline its accessibility, aligning it more closely with students’ existing workflows.

### **5. Conclusions and Recommendations**

This project highlights the transformative potential of Artificial Intelligence (AI) in education by showcasing how a personalized chatbot can enhance learning experiences. By addressing key challenges such as information overload and the need for timely support, the chatbot offered students a more accessible and engaging way to interact with course materials. Although the current version is limited in scope, it serves as a significant step toward creating adaptable, student-focused learning tools.

The chatbot demonstrated that AI can effectively support students in their academic journeys without replacing traditional teaching methods. Instead, it complements educators by enabling them to focus on more innovative and impactful teaching strategies. The positive feedback from students underscores the potential for AI tools to build confidence, simplify study processes, and improve academic performance. These benefits reveal a clear opportunity to further integrate AI into educational settings.

Despite its successes, the project also shed light on areas for improvement. Expanding the chatbot’s knowledge base and enhancing its ability to handle complex queries will be crucial for future iterations. Introducing additional features like interactive exercises and multimedia resources could also significantly enhance its functionality and appeal. Beyond technical improvements, embedding the chatbot into platforms already familiar to students, such as Microsoft Teams, would ensure its seamless adoption and sustained use.

This project reaffirms that AI is a powerful ally in creating inclusive and efficient learning environments. By tailoring education to the unique needs of students, AI tools can foster greater engagement and academic success. However, achieving this vision requires a commitment to ethical development, ensuring privacy and fairness remain at the forefront of innovation.

In conclusion, this chatbot is a promising example of how AI can reshape education. While its current version is only the beginning, it lays a solid foundation for future advancements. Continued research, refinement, and collaboration will be essential in transforming AI-driven tools into indispensable companions for learners, driving education toward a more inclusive, personalized, and adaptive future.

**7. References**

1. ACM Digital Library. (2023). AI-powered personalized learning systems: Bridging gaps in education. Proceedings of the 2023 Learning Technologies Conference, 115–128. <https://doi.org/10.1145/3678392.3678393>

2. Ambroise, B., Maxime, G., Pamela, B. L., & Corinna, M. S. (2024, July 13). Effective learning with a personal AI tutor: A case study. Education and Information Technologies. Retrieved from <https://link.springer.com/article/10.1007/s10639-024-12888-5>

3. Bangert-Drowns, R. L., Kulik, C. C., Kulik, J. A., & Morgan, M. (1991). The instructional effect of feedback in test-like events. Review of Educational Research, 61(2), 213–238. <https://doi.org/10.3102/00346543061002213>

4. Black, P., & Wiliam, D. (1998). Assessment and classroom learning. Assessment in Education: Principles, Policy & Practice, 5(1), 7–74. <https://doi.org/10.1080/0969595980050102>

5. Botpress. (2024). Open-source conversational AI platform. Retrieved from <https://botpress.com/>

6. Cassady, J. C., & Johnson, R. E. (2002). Cognitive test anxiety and academic performance. Contemporary Educational Psychology, 27(2), 270–295. <https://doi.org/10.1006/ceps.2001.1094>

7. College Tools. (2023, August 30). The evolving landscape of exam preparation: AI’s impact on business and economics education. College Tools Blog. Retrieved from <https://www.collegetools.io/blog/the-evolving-landscape-of-exam-preparation:-al’s-impact-on-business-and-economics-education>

8. Fabel, A. (2024, May 11). AI-assisted tutoring: The future of personalized learning support. ELearning Industry. Retrieved from <https://elearningindustry.com/ai-assisted-tutoring-the-future-of-personalized-learning-support>

9. Forbes Technology Council. (2024, July 22). Personalized learning and AI: Revolutionizing education. Forbes. Retrieved from <https://www.forbes.com/councils/forbestechcouncil/2024/07/22/personalized-learning-and-ai-revolutionizing-education/>

10. Hattie, J., & Timperley, H. (2007). The power of feedback. Review of Educational Research, 77(1), 81–112. <https://doi.org/10.3102/003465430298487>

11. Jain, A., & Kulkarni, R. (2023). AI tutors and their role in education: Addressing challenges and opportunities. Journal of Education and Technology Studies, 17(2), 89–102.

12. Lemann, N. (1999). The big test: The secret history of the American meritocracy. Farrar, Straus, and Giroux.

13. Milberg, T. (2024, April 28). The future of learning: How AI is revolutionizing education 4.0. World Economic Forum. Retrieved from <https://www.weforum.org/stories/2024/04/future-learning-ai-revolutionizing-education-4-0/>

14. New America Foundation. (2024). Exploring the impact of AI on personalized learning in high school. Teaching, Learning, and Technology Blog. Retrieved from <https://newamerica.org/teaching-learning-tech/blog-posts/exploring-the-impact-of-ai-on-personalized-learning-in-high-school/>

15. Popham, W. J. (2008). Transformative assessment. ASCD.

16. Roediger, H. L., & Butler, A. C. (2011). The critical role of retrieval practice in long-term retention. Trends in Cognitive Sciences, 15(1), 20–27. <https://doi.org/10.1016/j.tics.2010.09.003>

17. Shepard, L. A. (2000). The role of assessment in a learning culture. Educational Researcher, 29(7), 4–14. <https://doi.org/10.3102/0013189X029007004>

18. Smith, P. (2024). Ethical considerations in AI-driven education. International Review of Educational Ethics, 21(1), 45–59.

19. Spielberger, C. D., & Vagg, P. R. (1995). Test anxiety: A transactional process model. In C. D. Spielberger & P. R. Vagg (Eds.), Test anxiety: Theory, assessment, and treatment (pp. 3–14). Taylor & Francis.

20. SpringerOpen. (2023). Exploring the role of AI-powered chatbots in education. International Journal of Educational Technology, 10(3), 45–62. Retrieved from <https://educationaltechnologyjournal.springeropen.com/articles/10.1186/s41239-023-00426-1>

### **8. Appendices**

GitHub repository:  
 <https://github.com/sunnyachak/AI_FinalProject>