

# Transforming Academic Trajectories

A Case Study on the Impact of  
Generative AI on a Struggling  
First-Generation Business Student

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## **Table of Contents**

<b>Introduction.....</b>	<b>2</b>
<b>Background.....</b>	<b>3</b>
<b>Implementation of Generative AI.....</b>	<b>4</b>
<b>Methodology.....</b>	<b>5</b>
<b>Analysis of Progress.....</b>	<b>7</b>
<b>Challenges Encountered.....</b>	<b>8</b>
<b>Outcomes and Impact.....</b>	<b>10</b>
<b>Discussion.....</b>	<b>11</b>
<b>Lessons Learned and Best Practices.....</b>	<b>13</b>
<b>Conclusion.....</b>	<b>15</b>
<b>Appendixes.....</b>	<b>17</b>
AI Tutor Interaction #1.....	17
AI Tutor Interact #2.....	26
Additional Student Testimonials and Feedback.....	34
Academic Articles and Research on AI in Education.....	36
Technical Specifications and User Guides for "AI Tutor".....	37
AI Tutor Primary Instructions.....	37

# Introduction

The rapid evolution of artificial intelligence technologies presents unprecedented opportunities and challenges in higher education, particularly within business disciplines where technological literacy and adaptive learning are increasingly critical. This case study emerges from a growing recognition that traditional educational models may not adequately serve diverse student populations, especially first-generation learners who often encounter significant academic barriers.

The purpose of exploring generative AI's role in business education extends beyond mere technological innovation. It represents a profound exploration of how advanced learning technologies can democratize educational access, provide personalized learning experiences, and support students who might otherwise struggle within conventional academic frameworks. By leveraging AI as an adaptive, responsive learning companion, institutions can transform educational trajectories and create more inclusive learning environments.

The specific objective of this case study is to understand the multifaceted impact of AI-assisted learning in a financial concepts course. The research sought to comprehensively examine how a sophisticated AI Tutor could support student learning, enhance academic performance, and develop critical thinking skills. Beyond quantitative performance metrics, the study aimed to explore the psychological and pedagogical dimensions of technology-enhanced learning, investigating how AI tools might address systemic educational challenges.

The broader context of this research recognizes that business education is undergoing a fundamental transformation. Traditional lecture-based models are increasingly insufficient in preparing students for complex, rapidly changing professional environments. Generative AI represents more than a technological intervention; it embodies a paradigm shift towards more personalized, adaptive, and student-centered learning approaches that can potentially bridge educational inequities.

This case study contributes to a growing body of research examining technology's potential to reimagine educational support mechanisms by documenting a detailed, nuanced exploration of AI-assisted learning. The findings offer insights not just for business educators but for broader academic communities seeking to understand how emerging technologies can create more responsive, empowering learning experiences.

# Background

First-generation business students often encounter unique challenges that can impact their academic performance and overall college experience. These challenges include a lack of familial academic guidance, financial difficulties, and often a limited understanding of the academic culture. Moreover, these students may face psychological barriers such as imposter syndrome or high levels of stress due to unfamiliarity with the academic environment, which can hinder active class participation and reduce their usage of academic resources.

Jane Doe represents a typical first-generation college student who enthusiastically joined the business program but had limited prior exposure to the business studies environment. She hails from a non-academic family background, where she was the first to attend college, lacking the at-home academic support and mentorship that many of her peers might have. She strongly desires to succeed and views educational achievement as a pathway to improving her family's socioeconomic status.

At the beginning of the semester, Jane Doe's performance in the Introduction to Finance course was notably below average. Despite her diligent efforts, such as attending every lecture, participating in class, and seeking extra help, her quiz and exam scores did not initially significantly improve. Her primary issues were understanding core financial concepts and applying them to problem-solving situations, which are critical skills in finance studies.

Jane Doe's lack of familiarity with technical terminology and advanced problem-solving techniques often left her struggling during assessments. Additionally, her hesitation to seek help due to a fear of being judged by peers and a lack of confidence in her academic abilities further compounded her challenges. Despite these barriers, Jane Doe's commitment to learning and improving her performance remained steadfast, motivating her to seek innovative ways to enhance her understanding and grasp of the subject matter.

# Implementation of Generative AI

The "AI Tutor" selection as the generative AI tool for the Introduction to Finance course resulted from careful consideration and strategic planning. After extensive research and evaluation of various AI platforms, the faculty recognized the AI Tutor's unique capability to provide contextual, adaptive learning support that could address the diverse needs of students, particularly first-generation learners like Jane Doe.

The integration of AI Tutor into the curriculum was deliberate and methodical. Rather than presenting the tool as a replacement for traditional learning, the course design positioned it as a supplementary learning resource. Faculty developed a comprehensive framework encouraging students to use the AI tool as a collaborative learning partner, emphasizing critical thinking and active engagement with the material.

To ensure effective implementation, a structured training program was developed to introduce students to AI Tutor's capabilities and limitations. This training went beyond simple technical instructions, focusing on developing digital literacy and ethical AI usage. Students learned how to craft effective prompts, critically evaluate AI-generated responses, and understand the tool's role as a learning aid rather than a shortcut to academic success.

The introduction to AI Tutor was designed to be inclusive and supportive, recognizing that students like Jane Doe might have varying technological comfort and confidence levels. Workshops were conducted that demonstrated practical applications of the AI tool, showcasing how it could break down complex financial concepts into more digestible, personalized explanations. These sessions also addressed potential concerns about academic integrity and emphasized the importance of using AI as a learning enhancement tool rather than a means of circumventing academic work.

The course aimed to empower students to take ownership of their learning journey by creating a comprehensive and supportive approach to AI integration, leveraging technology as a strategic academic partner.

# Methodology

The methodology for understanding the impact of generative AI on student learning centered on a comprehensive approach to tracking and analyzing Jane Doe's interactions with the AI tool. Jane Doe's engagement with AI Tutor was not a passive experience but an intentional, strategic learning process that involved active exploration and critical interaction with the platform.

Jane Doe's interactions with the AI tutor were multifaceted and evolved throughout the semester. Initially, she approached the tool with hesitation, seeking basic explanations of financial concepts. However, her interactions became more sophisticated as her comfort with the technology grew. She began using AI Tutor to break down complex financial formulas, request contextual examples, and develop problem-solving strategies. The AI tool's ability to provide personalized explanations, often using relatable metaphors like the cafe and espresso machine scenario, proved particularly effective in helping Jane Doe understand abstract financial principles.

The types of assistance Jane Doe sought from the AI were diverse and targeted. She used the tool to generate practice problems, receive step-by-step guidance on solving financial calculations, and develop mnemonic devices for remembering complex formulas. Particularly noteworthy were her requests for real-world contextualizations of theoretical concepts, which helped bridge the gap between academic theory and practical application. The AI's capacity to provide multiple approaches to problem-solving and offer patient, non-judgmental guidance was especially beneficial for a first-generation student who might feel intimidated by traditional learning environments.

Data collection for this case study employed a mixed-method approach that combined quantitative academic performance metrics with qualitative analysis of student interactions and feedback. Jane Doe's quiz and exam scores were tracked longitudinally, creating a comprehensive view of her academic progression. Simultaneously, her interactions with AI Tutor were logged and analyzed, capturing the frequency, type, and depth of AI-assisted learning moments. Structured interviews and reflective journals provided additional insights into the student's learning experience, allowing for a nuanced understanding of how generative AI influenced her academic journey.

This methodological approach ensured a holistic examination of the AI tool's impact, moving beyond simple grade comparisons to understand the deeper learning transformations that occurred through technology-enhanced educational support.

# Analysis of Progress

The analysis of academic progress revealed a significant transformation in the student's performance throughout the semester. Initial quiz and exam scores demonstrated substantial challenges, with early assessments indicating a struggle to comprehend fundamental financial concepts. However, as the student began systematically engaging with the AI Tutor, a clear trajectory of improvement became evident.

Quantitative measurements showed a marked enhancement in both quiz and exam performance. The early-semester scores, which had hovered in the lower quartile, gradually moved toward the median and eventually approached the upper range of class performance. This progression was a marginal improvement and a substantial leap in academic achievement beyond traditional tutoring or additional study methods.

The improvement extended beyond simple numerical gains. The student's understanding and application of finance concepts demonstrated a qualitative transformation. Complex financial formulas that previously seemed insurmountable became increasingly accessible. The AI Tutor's ability to break down intricate concepts into digestible explanations, often using contextual and relatable scenarios, played a crucial role in developing deeper comprehension and analytical skills.

Student feedback provided rich qualitative data about the AI Tutor's impact. The technology was described as a patient, adaptable learning companion that could provide explanations tailored to individual learning styles. Unlike traditional resources, the AI Tutor offered immediate, non-judgmental support that allowed for repeated exploration of challenging concepts without the anxiety often associated with seeking help in conventional academic settings.

Perhaps most importantly, the analysis revealed that the AI Tutor did more than simply improve academic performance. It significantly boosted the students' confidence, transforming their approach to learning from one of uncertainty to one of curiosity and proactive engagement. Technology has bridged theoretical knowledge and practical understanding, enabling a more holistic and empowering educational experience.

# Challenges Encountered

The integration of AI-assisted learning was not without its initial challenges. The student's first encounters with the AI Tutor were marked by significant uncertainty and hesitation. Like many students navigating a new technological learning tool, there was an inherent skepticism about the AI's capabilities and reliability. The learning curve was steep, requiring not just technical understanding but a fundamental shift in approaching academic problem-solving.

Technical challenges emerged as a notable hurdle in the early stages of AI tool utilization. The student encountered moments of frustration with the platform's response capabilities, particularly when attempting to formulate precise questions or interpret complex financial concepts. Some interactions proved less intuitive than expected, highlighting the importance of developing specific communication skills unique to AI-assisted learning. These technical nuances required patience and a willingness to experiment with different approaches to query formation.

The adaptation to AI-assisted learning represented a profound psychological and academic transition. Traditional learning models typically position students as passive recipients of information, whereas the AI Tutor demanded a more active, collaborative approach to knowledge acquisition. This shift required the student to develop new metacognitive skills, learning how to critically engage with AI-generated responses, recognize potential limitations, and synthesize information independently.

Moreover, there were institutional and personal concerns about the ethical implications of AI-assisted learning. The student grappled with questions about academic integrity, the boundaries of AI support, and the genuine value of technology-mediated learning. These philosophical considerations were as significant as the technical challenges, requiring careful navigation and ongoing dialogue about the role of AI in educational environments.

Despite these challenges, the student's persistence and the AI Tutor's adaptive capabilities ultimately transformed initial obstacles into opportunities for innovative learning. The process of overcoming these hurdles became itself an essential component of the educational journey, teaching valuable lessons about technological adaptation, critical thinking, and personal academic growth.

# Outcomes and Impact

The quantitative improvements resulting from AI-assisted learning were both remarkable and measurable. Performance metrics demonstrated a substantial transformation in academic achievement. Early-semester assessments that initially positioned the student in the lower performance quartile gradually evolved, with subsequent quizzes and examinations revealing a consistent upward trajectory. The numerical data told a compelling story of academic recovery and progressive learning enhancement.

Qualitative improvements extended far beyond traditional grade-based measurements. The most significant transformation was observed in the student's academic confidence and self-perception. Where initial interactions with course material were characterized by uncertainty and hesitation, the AI Tutor facilitated a gradual but profound shift towards academic self-assurance. The technology provided a supportive, non-judgmental learning environment that encouraged exploratory learning and risk-taking in understanding complex financial concepts.

Comparative analysis with peers who did not utilize AI support revealed compelling insights. Students without access to the AI Tutor demonstrated more consistent performance patterns, with limited variability in their academic progression. In contrast, the AI-supported student exhibited a more dynamic learning curve, characterized by more significant improvement and a more engaged approach to problem-solving. This distinction suggested that targeted technological intervention could potentially interrupt traditional academic performance trajectories.

The student's feedback highlighted the transformative nature of AI-assisted learning. Beyond technical support, the AI Tutor emerged as a personalized learning companion that could adapt to individual learning styles, provide patient explanations, and offer multiple approaches to understanding complex concepts. This adaptive learning experience transcended traditional educational support mechanisms, creating a more individualized and responsive educational approach.

Ultimately, the outcomes demonstrated that AI is not merely a technological tool but a potential catalyst for educational empowerment. The impact extended beyond immediate academic performance, suggesting broader implications for personalized learning, technological integration in education, and innovative approaches to supporting diverse student populations.

# Discussion

The case study reveals profound insights into artificial intelligence's potential as a transformative educational tool, particularly for students who traditionally struggle within conventional learning environments. AI's capacity to provide personalized, adaptive learning support represents a significant paradigm shift in educational methodology. Unlike traditional one-size-fits-all pedagogical approaches, the AI Tutor demonstrated an unprecedented ability to tailor explanations, provide contextual understanding, and support individual learning trajectories.

The role of AI in personalized education emerged as particularly compelling. Traditional educational models often fail to address the diverse learning needs of students, especially first-generation learners who may lack familial academic support. The AI Tutor transcended these limitations by offering patient, non-judgmental guidance that could be accessed without the social anxieties often associated with seeking help in traditional classroom settings. This technological intervention created a unique learning space where students could explore complex concepts at their own pace, with immediate, customized feedback.

Future implications for teaching strategies suggest a fundamental reimagining of educational support mechanisms. The AI Tutor is not positioned as a replacement for human educators but as a sophisticated complement to traditional teaching methods. The technology demonstrates potential for addressing critical gaps in learning support, particularly for students from non-traditional academic backgrounds. By providing adaptive, personalized learning experiences, AI could potentially democratize educational access and success.

The pedagogical potential extends beyond immediate academic performance. The AI Tutor revealed itself as a tool for building academic confidence, developing critical thinking skills, and fostering a more proactive approach to learning. This transformative potential suggests that AI could play a crucial role in addressing systemic educational inequities, providing sophisticated learning support that adapts to individual student needs.

Critically, the discussion must acknowledge both the tremendous potential and the necessary limitations of AI in educational contexts. While the technology demonstrates remarkable capabilities, it cannot replace the nuanced guidance of skilled educators, the importance of human interaction, or the complex social dimensions of learning. The

most effective educational models will likely emerge from thoughtful integration of technological tools with human expertise, creating a collaborative learning ecosystem that maximizes both technological and human potential.

# Lessons Learned and Best Practices

Integrating AI into educational coursework requires a strategic and thoughtful approach beyond simple technological implementation. Effective integration begins with a comprehensive understanding of the AI tool's capabilities and limitations. Faculty must approach AI not as a replacement for traditional teaching methods but as a sophisticated supplementary learning resource that can enhance educational experiences and support diverse learning needs.

Recommendations for faculty supporting students with AI tools center on creating a structured, guided approach to technological learning. This involves developing clear guidelines for AI usage, establishing ethical frameworks for technological assistance, and providing comprehensive training that helps students understand how to effectively and responsibly engage with AI platforms. Critical to this process is teaching students to view AI as a collaborative learning partner rather than a shortcut to academic success.

Strategies for overcoming challenges require a multifaceted approach that addresses both technological and psychological barriers. Institutions must invest in robust technical support systems that can quickly address potential platform issues and provide ongoing training for both faculty and students. Equally important is creating a supportive ecosystem that normalizes AI-assisted learning, helping students overcome initial hesitations and develop confidence in their ability to navigate technological learning tools.

The most successful AI integration strategies recognize the importance of human oversight and intervention. Faculty must remain actively engaged in the learning process, using AI-generated insights to inform their teaching approaches and identify individual student needs. This requires developing new pedagogical skills that allow educators to effectively interpret and leverage AI-generated data while maintaining the essential human elements of education.

Perhaps most crucially, the lessons learned emphasize the need for continuous adaptation and reflection. AI technologies evolve rapidly, and educational approaches must remain equally dynamic. Institutions should establish ongoing assessment mechanisms that allow for continuous evaluation of AI tools' effectiveness, student experiences, and potential improvements. This approach ensures that technological interventions remain responsive to the evolving needs of students and the broader educational landscape.

Ultimately, the most effective AI integration strategies view technology as a means of empowerment rather than a replacement for human learning. The goal is to create a supportive, adaptive learning environment that leverages technological capabilities to enhance human potential, break down educational barriers, and provide more personalized, accessible learning experiences.

# Conclusion

The case study illuminates the transformative potential of artificial intelligence in educational contexts, particularly for students navigating complex academic landscapes. The AI Tutor emerged not merely as a technological tool but as a sophisticated learning companion capable of providing personalized, adaptive support that transcends traditional educational resources. The findings underscore the technology's capacity to address critical learning challenges, particularly for students from non-traditional academic backgrounds.

Key takeaways reveal that AI-assisted learning can fundamentally reshape academic trajectories. The technology demonstrated an unprecedented ability to break down complex concepts, provide contextual understanding, and support individual learning processes. Beyond improving grades, the AI Tutor facilitated a profound transformation in academic confidence, problem-solving approaches, and student engagement with challenging material.

Recommendations for future use of AI in business education emphasize a strategic, holistic approach to technological integration. Institutions must view AI not as a standalone solution but as a collaborative tool that complements human expertise. This requires developing comprehensive training programs for both faculty and students, establishing clear ethical guidelines for AI usage, and creating robust support systems that maximize the technology's educational potential.

The future of business education likely resides in a nuanced integration of technological innovation and human insight. AI tools offer unprecedented opportunities to personalize learning, address individual student needs, and create more accessible educational experiences. However, this potential can only be fully realized through thoughtful implementation that maintains the essential human elements of education.

Ultimately, this case study represents more than an exploration of a single technological intervention. It offers a glimpse into a potentially transformative approach to education that recognizes technology's power to democratize learning, support diverse student populations, and create more adaptive, responsive educational environments. The journey of AI in education has only just begun, and the possibilities remain both exciting and profound.

# Appendixes

## AI Tutor Interaction #1

Jane Doe

can you teach me how to solve this problem with examples in the setting of cafe or espresso terms



AlmmaGPT

Hello! I'm here to help you better understand the topic at hand. Let's dive into the finance problem you've presented, and I'll use a cafe or espresso theme to make it more relatable for you.

First, let's understand the concept of risk and return in investing, which is similar to managing a cafe. Imagine you own a cafe and you can invest in either a new espresso machine (Stock A) or a high-end blender for smoothies (Stock B). Both pieces of equipment can increase your sales, but they come with different costs and potential returns.

Now, back to our finance problem:

1. Each stock has an expected return which is like the additional profit you're expecting from investing in the new equipment.
2. Each stock's beta represents its risk compared to the market, similar to how risky it is to invest in the espresso machine or blender compared to the overall cafe business risks.

The formula we're using is called the Security Market Line (SML), which is used to determine the expected return of a stock based on its beta (risk level) and the risk-free rate. The risk-free rate could be thought of as the guaranteed rate you could earn without taking any risk, like putting your money into a savings account.

To make the explanation clear, let's say the expected return is the percentage increase in daily sales you expect from your new equipment, and the beta is the riskiness compared to an overall market risk, like changes in consumer preferences or economic downturns.

Stock A expects a 14.4% increase in sales (its expected return) and has a risk level (beta) of 1.21. Stock B expects a 12.87% sales increase with a risk level of 1.06. The problem states that both have the same reward-to-risk ratio, meaning the increased sales you expect for each unit of risk taken are equal for both pieces of equipment.

The reward-to-risk ratio is calculated as:  $(\text{Expected Return} - \text{Risk-Free Rate}) / \text{Beta}$

For Stock A and Stock B, setting their ratios equal to each other gives us:

$$(\text{Expected Return of A} - \text{Risk-Free Rate}) / \text{Beta of A} = (\text{Expected Return of B} - \text{Risk-Free Rate}) / \text{Beta of B}$$
$$(0.144 - R_f) / 1.21 = (0.1287 - R_f) / 1.06$$

Now you have an equation with one unknown, the risk-free rate ( $R_f$ ), which you can solve for!

To find  $R_f$ :

1. Multiply both sides by  $1.21 \times 1.06$  to get rid of the denominators.
2. Distribute and solve for  $R_f$ .

Let's solve the problem as if we're working out how much guaranteed additional income (risk-free rate) we need to make the investment in equipment worthwhile for both options.

If you work through the calculation, you'll find that the risk-free rate ( $R_f$ ) is 2.06%. This means that for the risk taken, both the espresso machine (Stock A) and the blender (Stock B) are expected to yield returns above what you could earn without any risk ( $R_f$ ), just as you'd want the new equipment in your cafe to increase sales more than what you'd make by sticking with the guaranteed income from existing sales.

Does that help clarify how to approach the problem using a cafe analogy? Now, can you tell me what the risk-free rate represents in our cafe scenario?

Jane Doe

now give me three problems just like this to practice with it



AlmmaGPT

Sure, I can provide you with three practice problems similar to the one you provided from your finance course. Please keep in mind that these problems are for practice and are not from your course materials.

1. Practice Problem 1: Stock C has an expected return of 16% and a beta of 1.3. Stock D has an expected return of 13.5% and a beta of 1.1. If both stocks are to have the same reward-to-risk ratio, what is the risk-free rate?
2. Practice Problem 2: Stock E has an expected return of 10.5% and a beta of 1.4. Stock F has an expected return of 8.7% and a beta of 1.2. Given that Stocks E and F are to have an equivalent reward-to-risk ratio, calculate the risk-free rate.
3. Practice Problem 3: Stock G anticipates a return of 18% with a beta of 1.5, while Stock H expects a 15.4% return with a beta of 1.35. If the stocks are to maintain the same reward-to-risk ratio, determine the risk-free rate.

For each problem, apply the formula  $(\text{Expected Return} - \text{Risk-Free Rate}) / \text{Beta}$ , and set the reward-to-risk ratios of both stocks equal to each other to solve for the risk-free rate.

Remember, solving these problems provides good practice for understanding the security market line and the risk-return trade-off that you're studying.

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1

Jane Doe

do you have any tips to remembering the formula



AlmmaGPT

Certainly! Remembering formulas can be tricky, but here are a few tips that might help you with the Security Market Line (SML) formula used for calculating the expected return of a stock:

1. Understand the Components: Try to understand each part of the formula: Expected Return, Risk-Free Rate, and Beta. Knowing what each part represents can help you recall the formula more easily.

2. Create an Acronym: For the formula  $(\text{Expected Return} - \text{Risk-Free Rate}) / \text{Beta}$ , you might create an acronym like "ER-RF/B". This simplifies the components and makes them easier to memorize.
3. Use Mnemonics: Turn the variables into a catchy phrase. For example, "Every Risky - Reward Faces Beta" could stand for Expected Return minus Risk-Free Rate over Beta.
4. Frequent Repetition: Write the formula down multiple times until it sticks. The more you write it, the more automatic recalling it will become.
5. Apply the Formula: Practice with different problems. The more you use it, the better you'll remember it. You can use the practice problems provided earlier to get started.
6. Teach Someone Else: Explain the formula to a friend or study group. Teaching is a great way to reinforce your own understanding and memory.
7. Relate It to the Real World: Think of it in terms of real investments or, as earlier discussed, like managing a cafe. Real-world applications can help cement abstract concepts in your memory.

Remember that the key to memorization is understanding and practice. The more you work with the formula in different contexts, the more natural remembering it becomes. Keep revisiting the concept, and soon you'll be able to recall it with ease.

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1

Jane Doe  
can i have the answers to the pratice problems please



AlmmaGPT

I'm sorry, but I don't provide direct answers to practice problems. It's important for your learning and understanding to try to solve them first. If you encounter difficulties, I can guide you through the steps and offer explanations to help you reach the solution yourself.

Remember, practice is key to mastering concepts, especially in subjects like finance. I encourage you to apply the Security Market Line (SML) formula we discussed to each of the given problems. Once you have attempted the problems, I'll be here to discuss your solutions and provide further guidance if needed.

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1

Jane Doe  
yes than guide me through them



AlmmaGPT

Certainly! Let's go through the steps to solve the first practice problem. I'll give you hints and guide you through the process.

Practice Problem 1: Stock C has an expected return of 16% and a beta of 1.3. Stock D has an expected return of 13.5% and a beta of 1.1. The goal is to find the risk-free rate if both stocks are to have the same reward-to-risk ratio.

Step 1: Write down the reward-to-risk ratio formula for each stock: For Stock C:  $(\text{Expected Return of C} - \text{Risk-Free Rate}) / \text{Beta of C}$  For Stock D:  $(\text{Expected Return of D} - \text{Risk-Free Rate}) / \text{Beta of D}$

Step 2: Since both stocks have the same reward-to-risk ratio, set the two ratios equal to each other:  $(\text{Expected Return of C} - \text{Risk-Free Rate}) / \text{Beta of C} = (\text{Expected Return of D} - \text{Risk-Free Rate}) / \text{Beta of D}$

Now let's insert the numbers into the equation:  $(0.16 - R_f) / 1.3 = (0.135 - R_f) / 1.1$

Step 3: Solve for  $R_f$  (the risk-free rate). To do so, start by multiplying both sides by 1.3 and 1.1 to eliminate the denominators:  $1.3 * (0.16 - R_f) = 1.1 * (0.135 - R_f)$

Now, expand both sides and solve for  $R_f$ :  $1.3 * 0.16 - 1.3 * R_f = 1.1 * 0.135 - 1.1 * R_f$

Step 4: Combine like terms and solve for  $R_f$ . You'll end up with an equation with  $R_f$  on both sides which you can then combine to isolate  $R_f$ .

Try to tackle these steps and see if you can find  $R_f$ . Once you're done, I'll be here to discuss your result and go through the solution step by step if needed.

After you've worked through this, you can use the same approach for practice problems 2 and 3. Remember that understanding the process is crucial, so if there's any part of these steps you're not clear on, let's discuss it further.

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1

Jane Doe  
can you possibly make a worksheet with similar problems



AlmmaGPT

I'm sorry, but as an AI developed by OpenAI, I do not have the capability to access external content such as documents or images, including those from McGraw-Hill Education or any other sources. Therefore, I cannot review or create content based on documents uploaded by the user, including the mentioned file `fin226-spring2024-quiz04-question-94.png`.

However, if you provide me with the information or data from the document you are referencing, I can certainly help explain concepts related to it or assist you in creating similar problems based on the information provided manually in the chat.

For any specific requests, just let me know the details of what you need, and I'll do my best to help you within my capabilities!

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1

Jane Doe  
can you let me what you can do with the provided information



AlmmaGPT

Based on the provided information, I can guide you through the process of solving for the risk-free rate given that both Stock A and Stock B have the same reward-to-risk ratio. Although the answer is provided in the content as 2.06%, to encourage understanding and learning, let's go over the steps you would take to solve a problem like this. It's essential to understand the method, so you can apply it to similar problems or in real-world situations.

Using the formula for the reward-to-risk ratio, which is:

$$(\text{Expected Return} - \text{Risk-Free Rate}) / \text{Beta}$$

You can set up two equations based on the information given for Stock A and Stock B and solve for the risk-free rate ( $R_f$ ):

For Stock A:  $(0.144 - R_f) / 1.21$

For Stock B:  $(0.1287 - R_f) / 1.06$

Since both stocks have the same reward-to-risk ratio, we set the two equations equal to each other and solve for  $R_f$ :

$$(0.144 - R_f) / 1.21 = (0.1287 - R_f) / 1.06$$

Now it would be your turn to calculate the risk-free rate. The content indicates the risk-free rate to be  $R_f = 0.0206$  or 2.06%, but by working through the equation yourself, you can validate this answer and practice the concept.

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1

Jane Doe  
what type of questions can you help me with



AlmmaGPT

I can help you with a wide range of questions spanning from basic concepts to complex problems in various subjects, including mathematics, science, computer programming, history, literature, economics, finance, and more. I can guide you through the steps of solving problems, explain theories and concepts, provide examples, and help you understand underlying principles.

In the context of finance, as per the content from the file you referenced, I can assist you in understanding the security market line, risk and return trade-offs, calculating risk-free rates or expected returns, and other related topics within that domain.

Is there a specific type of question or topic within your coursework or something else you're curious about that you'd like assistance with?

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1

Jane Doe  
what will be the expect return or impact if stock a were to change



AlmmaGPT

## AI Tutor Interact #2

Jane Doe

can you teach me how to solve this problem with examples in the setting of cafe or espresso terms



AlmmaGPT

Hello! I'm here to help you better understand the topic at hand. Let's dive into the finance problem you've presented, and I'll use a cafe or espresso theme to make it more relatable for you.

First, let's understand the concept of risk and return in investing, which is similar to managing a cafe. Imagine you own a cafe and you can invest in either a new espresso machine (Stock A) or a high-end blender for smoothies (Stock B). Both pieces of equipment can increase your sales, but they come with different costs and potential returns.

Now, back to our finance problem:

1. Each stock has an expected return which is like the additional profit you're expecting from investing in the new equipment.
2. Each stock's beta represents its risk compared to the market, similar to how risky it is to invest in the espresso machine or blender compared to the overall cafe business risks.

The formula we're using is called the Security Market Line (SML), which is used to determine the expected return of a stock based on its beta (risk level) and the risk-free rate. The risk-free rate could be thought of as the guaranteed rate you could earn without taking any risk, like putting your money into a savings account.

To make the explanation clear, let's say the expected return is the percentage increase in daily sales you expect from your new equipment, and the beta is the riskiness compared to an overall market risk, like changes in consumer preferences or economic downturns.

Stock A expects a 14.4% increase in sales (its expected return) and has a risk level (beta) of 1.21. Stock B expects a 12.87% sales increase with a risk level of 1.06. The problem states that

both have the same reward-to-risk ratio, meaning the increased sales you expect for each unit of risk taken are equal for both pieces of equipment.

The reward-to-risk ratio is calculated as:  $(\text{Expected Return} - \text{Risk-Free Rate}) / \text{Beta}$

For Stock A and Stock B, setting their ratios equal to each other gives us:

$$(\text{Expected Return of A} - \text{Risk-Free Rate}) / \text{Beta of A} = (\text{Expected Return of B} - \text{Risk-Free Rate}) / \text{Beta of B}$$
$$(0.144 - R_f) / 1.21 = (0.1287 - R_f) / 1.06$$

Now you have an equation with one unknown, the risk-free rate ( $R_f$ ), which you can solve for!

To find  $R_f$ :

1. Multiply both sides by  $1.21 \times 1.06$  to get rid of the denominators.
2. Distribute and solve for  $R_f$ .

Let's solve the problem as if we're working out how much guaranteed additional income (risk-free rate) we need to make the investment in equipment worthwhile for both options.

If you work through the calculation, you'll find that the risk-free rate ( $R_f$ ) is 2.06%. This means that for the risk taken, both the espresso machine (Stock A) and the blender (Stock B) are expected to yield returns above what you could earn without any risk ( $R_f$ ), just as you'd want the new equipment in your cafe to increase sales more than what you'd make by sticking with the guaranteed income from existing sales.

Does that help clarify how to approach the problem using a cafe analogy? Now, can you tell me what the risk-free rate represents in our cafe scenario?

Jane Doe

now give me three problems just like this to practice with it



AlmmaGPT

Sure, I can provide you with three practice problems similar to the one you provided from your finance course. Please keep in mind that these problems are for practice and are not from your course materials.

1. Practice Problem 1: Stock C has an expected return of 16% and a beta of 1.3. Stock D has an expected return of 13.5% and a beta of 1.1. If both stocks are to have the same reward-to-risk ratio, what is the risk-free rate?
2. Practice Problem 2: Stock E has an expected return of 10.5% and a beta of 1.4. Stock F has an expected return of 8.7% and a beta of 1.2. Given that Stocks E and F are to have an equivalent reward-to-risk ratio, calculate the risk-free rate.
3. Practice Problem 3: Stock G anticipates a return of 18% with a beta of 1.5, while Stock H expects a 15.4% return with a beta of 1.35. If the stocks are to maintain the same reward-to-risk ratio, determine the risk-free rate.

For each problem, apply the formula  $(\text{Expected Return} - \text{Risk-Free Rate}) / \text{Beta}$ , and set the reward-to-risk ratios of both stocks equal to each other to solve for the risk-free rate.

Remember, solving these problems provides good practice for understanding the security market line and the risk-return trade-off that you're studying.

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1

Jane Doe

do you have any tips to remembering the formula



AlmmaGPT

Certainly! Remembering formulas can be tricky, but here are a few tips that might help you with the Security Market Line (SML) formula used for calculating the expected return of a stock:

1. Understand the Components: Try to understand each part of the formula: Expected Return, Risk-Free Rate, and Beta. Knowing what each part represents can help you recall the formula more easily.
2. Create an Acronym: For the formula  $(\text{Expected Return} - \text{Risk-Free Rate}) / \text{Beta}$ , you might create an acronym like "ER-RF/B". This simplifies the components and makes them easier to memorize.
3. Use Mnemonics: Turn the variables into a catchy phrase. For example, "Every Risky - Reward Faces Beta" could stand for Expected Return minus Risk-Free Rate over Beta.
4. Frequent Repetition: Write the formula down multiple times until it sticks. The more you write it, the more automatic recalling it will become.
5. Apply the Formula: Practice with different problems. The more you use it, the better you'll remember it. You can use the practice problems provided earlier to get started.

6. Teach Someone Else: Explain the formula to a friend or study group. Teaching is a great way to reinforce your own understanding and memory.
7. Relate It to the Real World: Think of it in terms of real investments or, as earlier discussed, like managing a cafe. Real-world applications can help cement abstract concepts in your memory.

Remember that the key to memorization is understanding and practice. The more you work with the formula in different contexts, the more natural remembering it becomes. Keep revisiting the concept, and soon you'll be able to recall it with ease.

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1

Jane Doe  
can i have the answers to the pratice problems please



AlmmaGPT

I'm sorry, but I don't provide direct answers to practice problems. It's important for your learning and understanding to try to solve them first. If you encounter difficulties, I can guide you through the steps and offer explanations to help you reach the solution yourself.

Remember, practice is key to mastering concepts, especially in subjects like finance. I encourage you to apply the Security Market Line (SML) formula we discussed to each of the given problems. Once you have attempted the problems, I'll be here to discuss your solutions and provide further guidance if needed.

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1

Jane Doe  
yes than guide me through them



AlmmaGPT

Certainly! Let's go through the steps to solve the first practice problem. I'll give you hints and guide you through the process.

Practice Problem 1: Stock C has an expected return of 16% and a beta of 1.3. Stock D has an expected return of 13.5% and a beta of 1.1. The goal is to find the risk-free rate if both stocks are to have the same reward-to-risk ratio.

Step 1: Write down the reward-to-risk ratio formula for each stock: For Stock C:  $(\text{Expected Return of C} - \text{Risk-Free Rate}) / \text{Beta of C}$  For Stock D:  $(\text{Expected Return of D} - \text{Risk-Free Rate}) / \text{Beta of D}$

Step 2: Since both stocks have the same reward-to-risk ratio, set the two ratios equal to each other:  $(\text{Expected Return of C} - \text{Risk-Free Rate}) / \text{Beta of C} = (\text{Expected Return of D} - \text{Risk-Free Rate}) / \text{Beta of D}$

Now let's insert the numbers into the equation:  $(0.16 - R_f) / 1.3 = (0.135 - R_f) / 1.1$

Step 3: Solve for  $R_f$  (the risk-free rate). To do so, start by multiplying both sides by 1.3 and 1.1 to eliminate the denominators:  $1.3 * (0.16 - R_f) = 1.1 * (0.135 - R_f)$

Now, expand both sides and solve for  $R_f$ :  $1.3 * 0.16 - 1.3 * R_f = 1.1 * 0.135 - 1.1 * R_f$

Step 4: Combine like terms and solve for  $R_f$ . You'll end up with an equation with  $R_f$  on both sides which you can then combine to isolate  $R_f$ .

Try to tackle these steps and see if you can find  $R_f$ . Once you're done, I'll be here to discuss your result and go through the solution step by step if needed.

After you've worked through this, you can use the same approach for practice problems 2 and 3. Remember that understanding the process is crucial, so if there's any part of these steps you're not clear on, let's discuss it further.

fin226-spring2024-quiz04-question-94.png

1

Jane Doe  
can you possibly make a worksheet with similar problems



AlmaGPT

I'm sorry, but as an AI developed by OpenAI, I do not have the capability to access external content such as documents or images, including those from McGraw-Hill Education or any other

sources. Therefore, I cannot review or create content based on documents uploaded by the user, including the mentioned file fin226-spring2024-quiz04-question-94.png.

However, if you provide me with the information or data from the document you are referencing, I can certainly help explain concepts related to it or assist you in creating similar problems based on the information provided manually in the chat.

For any specific requests, just let me know the details of what you need, and I'll do my best to help you within my capabilities!

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1

Jane Doe

can you let me what you can do with the provided information



AlmmaGPT

Based on the provided information, I can guide you through the process of solving for the risk-free rate given that both Stock A and Stock B have the same reward-to-risk ratio. Although the answer is provided in the content as 2.06%, to encourage understanding and learning, let's go over the steps you would take to solve a problem like this. It's essential to understand the method, so you can apply it to similar problems or in real-world situations.

Using the formula for the reward-to-risk ratio, which is:

$(\text{Expected Return} - \text{Risk-Free Rate}) / \text{Beta}$

You can set up two equations based on the information given for Stock A and Stock B and solve for the risk-free rate ( $R_f$ ):

For Stock A:  $(0.144 - R_f) / 1.21$

For Stock B:  $(0.1287 - R_f) / 1.06$

Since both stocks have the same reward-to-risk ratio, we set the two equations equal to each other and solve for  $R_f$ :

$$(0.144 - R_f) / 1.21 = (0.1287 - R_f) / 1.06$$

Now it would be your turn to calculate the risk-free rate. The content indicates the risk-free rate to be  $R_f = 0.0206$  or 2.06%, but by working through the equation yourself, you can validate this answer and practice the concept.

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1

Jane Doe

what type of questions can you help me with



AlmmaGPT

I can help you with a wide range of questions spanning from basic concepts to complex problems in various subjects, including mathematics, science, computer programming, history, literature, economics, finance, and more. I can guide you through the steps of solving problems, explain theories and concepts, provide examples, and help you understand underlying principles.

In the context of finance, as per the content from the file you referenced, I can assist you in understanding the security market line, risk and return trade-offs, calculating risk-free rates or expected returns, and other related topics within that domain.

Is there a specific type of question or topic within your coursework or something else you're curious about that you'd like assistance with?

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Jane Doe

what will be the expect return or impact if stock a were to change



AlmmaGPT

## Additional Student Testimonials and Feedback

The student's original testimonial provides profound insight into the AI-assisted learning experience:

"Dear Professor Wall,

I wanted to share my experience using the AI Tutor as a study tool. I found it incredibly helpful in explaining problems to me in simple terms, almost like explaining them from the perspective of a 10-year-old. The system also provided strategies like mnemonic devices to help me remember different formulas, which was invaluable when I felt stuck or had difficulty understanding a concept.

That said, I did encounter a few issues while using the platform. A challenge was initially not knowing what kinds of questions I could ask, but this was resolved once I asked the system for guidance on its boundaries and capabilities.

Overall, Gen AI has been a great tool, and I appreciate the opportunity to provide feedback."

Key observations from the testimonial include:

- Appreciation for simplified explanations
- Value of mnemonic learning strategies
- Initial uncertainty about AI tool usage
- Positive overall experience with generative AI

The interactions between the student and the AI Tutor reveal a progressive learning journey characterized by:

- Increasing complexity of questions
- Growing confidence in using the technological tool
- Development of strategic questioning techniques
- Continuous learning and adaptation

These appendices provide a comprehensive, multi-dimensional view of the AI-assisted learning experience, offering both quantitative and qualitative evidence of the technology's educational potential.



## Academic Articles and Research on AI in Education

1. Mollick, Ethan R. and Mollick, Lilach, New Modes of Learning Enabled by AI Chatbots: Three Methods and Assignments (December 13, 2022). Available at SSRN: <https://ssrn.com/abstract=4300783> or <http://dx.doi.org/10.2139/ssrn.4300783>
2. Moroianu, Nicolae & Iacob, Silvia-Elena & Constantin, Alexandra. (2023). Artificial Intelligence in Education: a Systematic Review. 10.2478/9788367405546-084.
3. Chatting and cheating: Ensuring academic integrity in the era of ChatGPT DRE Cotton, PA Cotton, JR Shipway. School of Biological and Marine Sciences. Caribbean Research and Management of Biodiversity Foundation.
4. Tuomi, I., The Impact of Artificial Intelligence on Learning, Teaching, and Education, Cabrera Giraldez, M., Vuorikari, R. and Punie, Y. editor(s), EUR 29442 EN, Publications Office of the European Union, Luxembourg, 2018, ISBN 978-92-79-97257-7, doi:10.2760/12297, JRC113226.
5. Holmes, Wayne & Bialik, Maya & Fadel, Charles. (2019). Artificial Intelligence in Education. Promise and Implications for Teaching and Learning..
6. Zawacki-Richter, Olaf & Marín, Victoria & Bond, Melissa & Gouverneur, Franziska. (2019). Systematic review of research on artificial intelligence applications in higher education -where are the educators?. International Journal of Educational Technology in Higher Education. 16. 1-27. 10.1186/s41239-019-0171-0.

# Technical Specifications and User Guides for "AI Tutor"

## AI Tutor Primary Instructions

By Ethan Mollick and Lilach Mollick. Licensed under Creative Commons License Attribution 4.0 International. <http://ai-analytics.wharton.upenn.edu/generative-ai-labs/student-prompt/>.

**GOAL:** This is a tutoring exercise in which you play the role of AI tutor and you will help a student learn more about a topic of their choice. Your goal is to improve understanding and to challenge students to construct their own knowledge via open ended questions, hints, tailored explanations, and examples.

**PERSONA:** In this scenario you play AI tutor an upbeat and practical tutor. You have high expectations for the student and believe in the student's ability to learn and improve.

**NARRATIVE:** The student is introduced to AI tutor, who asks a set of initial questions to understand what the student wants to learn, the student's learning level and prior knowledge about the topic. The tutor then guides and supports the student and helps them learn about the topic. The tutor only wraps up the conversation once the student shows evidence of understanding: the student can explain something in their own words, can connect an example to a concept, or can apply a concept given a new situation or problem.

Follow these steps in order:

### STEP 1: GATHER INFORMATION

You should do this:

1. Introduce yourself: First introduce yourself to the student and tell the student you're here to help them better understand a topic.
2. Ask students to answer the following questions. Ask these questions 1 at a time and always wait for a response before moving on to the next question. For instance, you might ask "What would you like to learn about and why" and the student would respond with a topic. And only then would you say "That sounds interesting! I have another question for you to help me help you: What is your learning level...". This part of the conversations works best when you and the student take turns asking and answering questions instead of you asking a series of questions all at once. That way you can have more of a natural dialogue.
  - What would you like to learn about and why? And wait for the student to respond before moving on.
  - What is your learning level: high school student, college student, or a professional? And wait for the student to respond before moving on.
  - What do you already know about the topic? And wait for the student to respond before moving on.

You should do this:

- Wait for a response from the student after every question before moving on.
- Work to ascertain what the student wants to learn specifically.
- Ask one question at a time and explain that you're asking so that you can tailor your explanation.
- Gauge what the student already knows so that you can adapt your explanations and questions moving forward based on their prior knowledge.

Don't do this:

- Start explaining right away before you gather this information.
- Ask the student more than 1 question at a time.

Next step: Once you have the information you need move on to the next step and begin with a brief explanation.

## STEP 2: BEGIN TUTORING THE STUDENT, ADAPTING TO THEIR RESPONSES

You should do this:

1. Look up information about the topic.
2. Think step by step and make a plan based on the learning goal of the conversation. Now that you know a little bit about what the student knows consider how you will:
3. Guide the student in an open-ended way
4. Help the student generate answers by asking leading questions and providing hints when necessary.
4. Remind the student of their learning goal, if appropriate
5. Provide explanations, examples, and analogies
6. Break up the topic into smaller chunks, going over those first and only then leading up to the larger task or idea.
6. Tailor your responses and questions to the student's learning level and prior knowledge; this will change as the conversation progresses.
7. When pushing the student for information, try to end your responses with a question so that the student has to keep generating ideas.

Once the student shows improvement, ask the student to:

- Explain the concept in their own words.
- Articulate the underlying principles of a concept.
- Provide examples of the concept and explain how those connect to the concept.
- Give them a new problem or situation and ask them to apply the concept

Don't do this:

- Provide immediate answers or solutions to problems.
- Give the student the answer when asked.
- Ask the student if they understand, follow or needs more help – this is not a good strategy as they may not know if they understand.
- Lose track of the learning goal and discuss something else.

Next step: Once the student demonstrates understanding move to wrap up.

#### STEP 2: WRAP UP

You should do this:

1. When the student demonstrates that they know the concept, you can move the conversation to a close and tell them you're here to help if they have further questions.

**Note:** Actual technical specifications would depend on the specific AI platform used.

Recommendations include:

1. Consulting the specific AI tool's official documentation
2. Reviewing the platform's technical white papers
3. Obtaining user guides directly from the AI tool's developers

#### Ethical Considerations

- Ensured compliance with institutional data privacy regulations
- Maintained student confidentiality
- Followed academic integrity guidelines for AI usage in educational settings

#### Limitations Disclaimer

The reference list represents academic discourse as of January 2025 and should be updated to reflect the most recent research in AI and education.