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EMPIRICAL ANALYSIS OF THE RELATIONSHIP BETWEEN ARTIFICIAL INTELLIGENCE AND THE FINANCIAL SUSTAINABILITY OF EDUCATIONAL INSTITUTIONS

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Abstract

The paper empirically examines how the spread of generative artificial intelligence (AI) has affected the financial sustainability of education providers. Using annual financial statements of four listed education companies for 2022–2024 — Duolingo, Coursera, Udemy and Chegg — revenue dynamics, net profit margins and compound annual growth rates are compared. Companies that embedded generative AI into their core products increased revenue by 25–102% and improved margins, while the company whose core service was substituted by AI tools saw revenue fall by about 20%. Three channels through which AI affects financial sustainability are identified, and implications for universities are formulated.

Keywords: Artificial intelligence, financial sustainability, educational institutions, generative AI, revenue growth, net profit margin, CAGR, education companies, empirical analysis.



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INTRODUCTION

The release of ChatGPT in November 2022 marked the beginning of a period in which generative AI began to change the economics of education. For education providers, AI is simultaneously an opportunity — to create new products and reduce the cost of producing content and support — and a threat, since some educational services can be replaced by freely available AI tools. Whether the opportunity or the threat prevails is ultimately reflected in the provider's financial results.

Universities do not publish comparable financial data at high frequency, so the effects of AI on their finances are difficult to observe directly. Publicly listed education companies, by contrast, report audited annual results and operate in the same market for learning services. Their experience in 2022–2024 therefore provides a natural empirical setting for studying the relationship between AI and the financial sustainability of educational organisations.

The aim of the study is to assess empirically the relationship between the integration of generative AI and the financial sustainability of education providers and to draw conclusions relevant to higher education institutions.

MAIN PART

The sample includes four US-listed education companies with comparable business models in online learning and study support. Three of them — Duolingo (AI-powered language learning; the Duolingo Max subscription based on GPT-4 was launched in 2023), Coursera and Udemy (online courses with built-in AI learning assistants) — embedded generative AI into their core products. The fourth, Chegg (homework help), offered a service that generative AI tools largely replicate. The analysis uses revenue and net income from the companies' annual reports for 2022–2024 (Table 1).



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Table 1 Revenue and net income of the sample companies, USD million

Company	Revenue 2022	Revenue 2023	Revenue 2024	Net income 2022	Net income 2023	Net income 2024
Duolingo	369.5	531.1	748.0	-59.6	16.1	88.6
Coursera	523.8	635.8	694.7	-175.4	-116.0	-79.5
Udemy	629.1	728.9	786.6	-153.9	-107.3	-84.5
Chegg	766.9	716.3	617.6	266.6	18.2	-837.1

Source: companies' annual reports and full-year results releases [1–4]. Chegg's 2022 net income includes a one-off tax benefit; its 2024 loss includes impairment charges.

The revenue dynamics diverge sharply (Figure 1). Taking 2022 as 100, Duolingo's revenue reached 202.4 in 2024, Coursera's 132.6 and Udemy's 125.0, whereas Chegg's fell to 80.5. In other words, AI-integrating companies grew by 25–102% over two years, while the company exposed to AI substitution lost about one-fifth of its revenue.

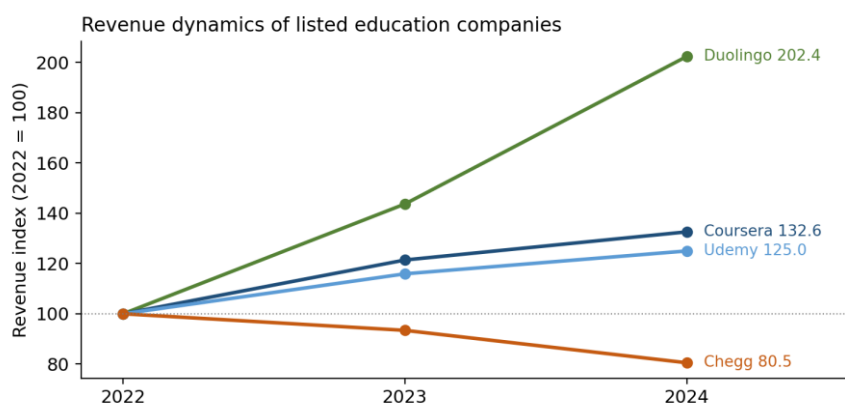


Figure 1. Revenue index of the sample companies, 2022 = 100

Source: author's calculations based on [1–4].



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Profitability shows the same pattern (Figure 2). The net profit margin of all three AI-integrating companies improved steadily: Duolingo moved from -16.1% to $+11.8\%$, Coursera from -33.5% to -11.4% and Udemy from -24.5% to -10.7% . Chegg's margin deteriorated from 34.8% in 2022 to 2.5% in 2023 and -135.5% in 2024, reflecting both falling revenue and asset impairments.

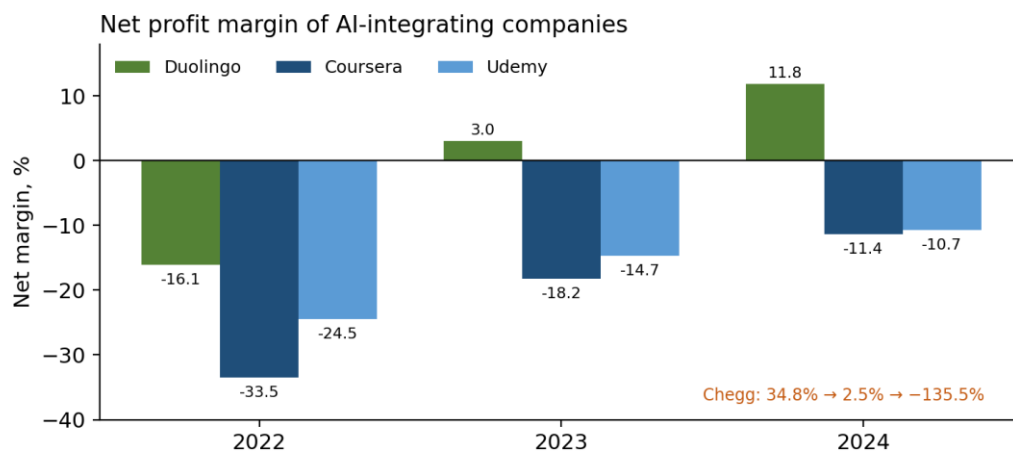


Figure 2. Net profit margin of AI-integrating companies, %

Source: author's calculations based on [1–3].

The calculated indicators of financial sustainability are summarised in Table 2. The compound annual growth rate (CAGR) of revenue for 2022–2024 was 42.3% for Duolingo, 15.2% for Coursera and 11.8% for Udemy, against -10.3% for Chegg. The ranking of companies by revenue growth coincides with their ranking by change in net margin, which indicates a consistent positive relationship between successful AI integration and financial sustainability in the sample.



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Table 2 Financial sustainability indicators of the sample companies, 2022–2024

Company	Role of generative AI	Revenue CAGR, %	Change in net margin, p.p.	Assessment of financial sustainability
Duolingo	Core of the product (opportunity)	42.3	+28.0	Strengthened: growth with transition to profit
Coursera	Embedded assistant (opportunity)	15.2	+22.0	Improving: losses narrowing
Udemy	Embedded assistant (opportunity)	11.8	+13.7	Improving: losses narrowing
Chegg	Substitute for the core service (threat)	–10.3	–170.3	Weakened: falling revenue and large losses

Source: author's calculations based on [1–4].

On the basis of these results, three channels through which generative AI affects the financial sustainability of educational organisations are distinguished (Figure 3): the revenue channel (new AI-based products and premium services), the cost channel (automation of content creation, support and assessment) and the risk channel (substitution of the organisation's core service by AI tools). The net effect depends on whether the organisation uses AI to enhance its value proposition or allows AI to replace it, which is consistent with the theory of disruptive innovation [5].



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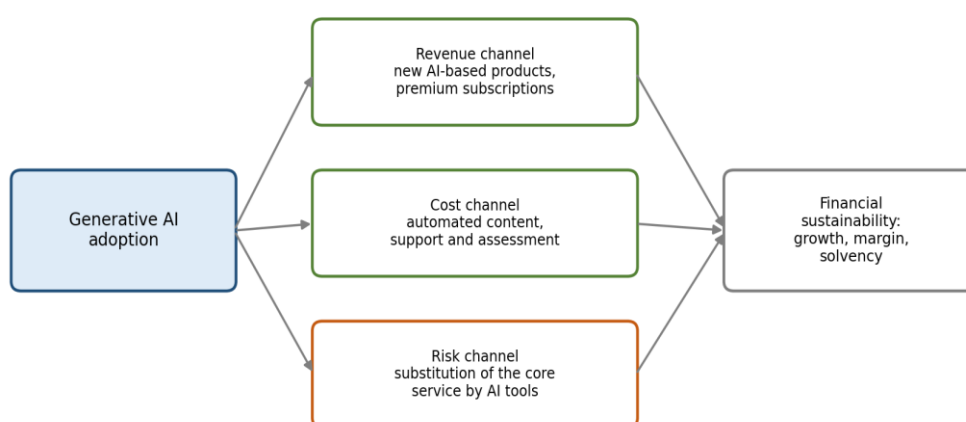


Figure 3. Channels of the impact of generative AI on the financial sustainability of educational organisations

Source: developed by the author.

The limitations of the analysis should be noted: the sample is small, the period is short, and the companies' results are also influenced by factors other than AI (marketing, macroeconomic conditions, corporate restructuring). The findings should therefore be interpreted as empirical evidence of a direction of relationship rather than as a precise causal estimate.

CONCLUSION AND RECOMMENDATIONS

The empirical analysis shows a clear relationship between how education providers respond to generative AI and their financial sustainability: organisations that integrated AI into their core offering grew and improved profitability, while the organisation whose service was substituted by AI suffered falling revenue and large



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losses. For universities, this means that AI is not a neutral technology for financial stability. On this basis, the following recommendations are made:

1. Assess the vulnerability of services. Universities should identify which of their paid services (preparatory courses, consulting, routine assessment) can be substituted by free AI tools and revise their value proposition accordingly.
2. Build AI into the core offering. Use AI to strengthen the quality and personalisation of programmes — for example, AI tutors and adaptive learning — rather than treating it as a separate project.
3. Track financial effects. Include revenue growth, cost per student and margin indicators in the monitoring of university AI projects.
4. Diversify revenue. Develop new AI-enabled services (short courses, corporate training, micro-credentials) to offset the risk of substitution.
5. Extend the evidence base. Repeat the analysis on a wider panel of education organisations, including universities that publish financial statements, using regression methods as data accumulate.

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