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The Evolution and Impact of AI on EdTech Business Models

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The Evolution and Impact of AI on EdTech Business Models (working paper)

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Keywords: Education Technology (EdTech), Business Model Innovation, Artificial Intelligence (AI), Digital Transformation, Personalized Learning

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Abstract:
This paper investigates the transformative role of Artificial Intelligence (AI) in shaping Education Technology (EdTech) business models, focusing on key components such as value creation, delivery, and capture. Through qualitative analysis and detailed case studies of companies like Sensavis, Duolingo, Byju's, and Coursera, we examine how AI integration drives personalized learning and optimizes educational delivery. Our findings highlight the dynamic nature of EdTech business models, emphasizing the necessity for continuous innovation and strategic adaptation in response to AI advancements. We conclude with potential AI-driven scenarios for future education, exploring their implications for EdTech business models and the broader educational landscape.

Introduction

The global Education Technology (EdTech) industry is experiencing unprecedented growth, driven by advancements in digital infrastructure, artificial intelligence (AI), and machine learning, as well as evolving workforce dynamics. According to HolonIQ (2019), the global EdTech market is projected to reach $404 billion by 2025, reflecting the rising need for upskilling and reskilling in a rapidly changing job market. The World Economic Forum (2022) predicts significant workforce shifts, with the displacement of 83 million jobs and the creation of 69 million new roles over the next five years, underscoring the urgent need for digital transformation in education.

EdTech encompasses a wide range of technologies, from classroom projectors to immersive virtual reality labs, all aimed at enhancing learning experiences across educational levels. AI is pivotal in this transformation, driving personalized learning plans and optimizing content delivery through adaptive platforms like Duolingo (Duolingo, 2023). Additionally, AI chatbots and virtual assistants offer continuous support, while AI-enabled translation tools remove linguistic barriers, creating global learning opportunities (OECD, 2020).

As AI technologies continue to evolve, they significantly impact how EdTech companies structure their business models. The integration of AI enables companies to adopt scalable learning platforms, meeting the dynamic skill requirements of various sectors, including information technology, banking, and e-commerce (McKinsey, 2023). Digital platform business models are becoming increasingly central to EdTech innovation, offering scalable solutions for corporate learning (Mahadevan, 2000).

This paper aims to explore how AI integration transforms EdTech business models. Specifically, it addresses the research question: How do existing EdTech business models and digital value propositions change with the integration of AI? To answer this, we analyze case studies and industry reports, focusing on core business model components such as value creation, delivery, and capture.

Objectives and Structure

The objective of this paper is to provide a comprehensive understanding of the impacts,

transformations, and innovations in EdTech business models due to AI integration. The paper is structured as follows: First, we discuss the elements of business models and the concept of business model innovation. Next, we present detailed case studies of various EdTech companies, illustrating the dynamic nature of business models. Finally, we explore future scenarios for AI in EdTech and discuss their potential implications for the industry.

By examining these aspects, we aim to highlight the necessity for continuous innovation and strategic adaptation in the EdTech sector, ensuring that companies can effectively leverage AI to enhance educational delivery and outcomes.

Methodology

This study adopts a qualitative approach, analyzing literature, case studies, and industry reports to explore AI's impact on EdTech business models. We selected case studies based on their prominence and innovative use of AI. Data collection included reviewing academic articles, industry analyses, and direct case study materials to understand evolving business models.

Elements of business models and business model innovation

In this section we take a step back and start from the business model concept. There is an abundance of business model studies, research and guidelines focusing on the business model concept and its components. For example, widely spread and applied is the so called Business Model Canvas (Osterwalder 2005) with its nine business model components and how these are connected in different types of business models, and often being labelled by the form of revenue created: ad based freemium models, subscription models, non-profit donation-based models, double-sided platform models etc. Some of these we also find in the edtech industry. The Khan-Academy emerged based on a free, donation-based business model, while Duolingo's language learning app business emerged based on a hybrid between ad-supported and freemium models, just to mention two. In this section we simplify the conceptualization by elaborating on three fundamental business model innovation components: value creation, value delivery and value capture. We also revisit the value proposition component.

Elements of EdTech business models

In a study where the idea of a business modelling perspective was presented (Andersson & Mattsson 2015) the business model concept was described in the following way: "There is a diversity of understanding and use of business models (Osterwalder et al., 2005). Some business models are customer-value oriented and some are more technology oriented. The former are more outward looking and the latter are more inward looking. Even if there exists a plethora of definitions of the business model concept, the dominating perspective is that they are... "a sort of blueprint for how a service provision may be organized and how values and revenues should be realized."(ibid). When edtech business models are discussed and problematized attention is often directed towards the revenue model, or the value capture dimension and component of the overall model. How are we going to get paid for our edtech products and services, how are we going to prize them, and in what different ways can we charge the customer? In other words, the business model matters of concern are heavily focused on the exchange of economic value. "The edtech business model" is sometimes summed up as for example "a freemium model", "a subscription model" etc. We argue here that a viable edtech business model should include a more integrated view. Every economic component of the model will be dependent on, for example, how the value is created in the edtech ecosystem, how the value is delivered to the customers and the users, and how the value proposition is developed and presented.

EdTech business model innovation: value creation, value delivery and value capture

As stated above, we redirect attention to the conceptualization of business model innovation describing value creation, value delivery and value capture. The strong interdependence between the three over time has been studied in a longitudinal study of the edtech company Sensavis' emergence and change over several years including rapid internationalization. (see eg. Badhani & Mut 2017; Andersson & Mattsson 2018). It describes the edtech company's business development including value proposition change from tool provider to product company, from product company to software provider and from software provider to

edtech service company.

The case shows how the edtech company's value creation as part of its business model innovation is totally dependent on the continuous development of its partner network. Through distribution partners, investor connections etc. new customer and customer segments are reached, in turn leading to new forms of value creation. For the small entrepreneurial company, the network of social contacts was crucial for the development of the company's value creation over time. The company also supported social networking between users/customers as a way to get new customers, and to get new ideas for its edtech service development. This also reduced customer acquisition costs and was a way to identify lead users among teachers in its growing user network, and later to change the value creation towards more intense co-creation together with customers.

The case also shows the challenges of developing the edtech company's value delivery operations and systems. This was above all connected to the growing awareness and understanding of the complexity of the public buyer side and what different actors on the buyer side viewed as creating value to them, i.e. a different value for the different actors in the so called buying centers involved in the procurement of edtech, tools, solutions and systems. Being close to the users (teachers and students) made it possible also to understand the local networks and circumstances, and then start adapting local value propositions and arguments when selling the edtech services and tools. Local presence also gave better possibilities to find and approach potential and for the company best suited middlemen and distributors, a big challenge for a small, entrepreneurial edtech startup.

Finding the best solution for the company's value capture was also a challenge. A big shift was to go from cost-based pricing to value-based pricing. With presence in more markets and more users came also the insight that pricing needed to be differentiated. Customers needed more flexibility and more options to pay for the company's edtech services. Parallel to this process the company also needed to address the internal cost side, creating more economies of scale in various internal and external activities.

Revisiting the dynamic value proposition: the importance of networks and partnerships

Our studies of emerging and growing edtech firms indicate that the firms that seem to have a stable growth have had a both pragmatic and proactive way of working with their business models, i.e. using business model innovation and change as a way to create a stable position and growth. This on an edtech market that for many of them is still characterized by high uncertainty. Edtech companies with a stable development (we hesitate to use the word "successful") in this market tend to take a proactive approach to business model development driven by collaboration with other actors; customers and partners. Their value creation and value proposition development is driven by proactively engaging in new, and engaging deeper in existing, external relationships. It is also the way in which these edtech companies sense and make use of changes in the market. Consequently, these proactive edtech companies have through these networking driven business model innovation processes a better chance to be market shaping, i.e. being on the frontline of actively shaping the emerging edtech market.

This includes also actively changing the value delivery part of the business model through proactive networking actions. An example is one of the studied edtech companies delivering digital education tools for K12 schools. Following closely some of the lead user teachers and their interactions with the students when using the edtech tools gave them insights into the interactions between the students during lessons, but also after lessons, when exchanging experiences of using the tools and also concerning the focal content. This led the edtech company to develop a complementary phone app specifically aimed for the students' interactions. In addition, new software aimed for the teachers was developed, specifically aimed for encouraging teachers, irrespective of location, to exchange experiences from using the company's edtech tool. In other words, the company was proactively using its social networking abilities to change the interactions between students, between teachers and between students and teachers. All connected to a proactive and pragmatic development of the company's value proposition.

A second business model effect of proactively using social networking in his way was that the edtech company was able to deepen its understanding of the importance of the many intangible values created by the service offering (e.g how the edtech tool supported new forms of social interaction and learning processes) and how these intangible values could be enhanced in representations of the value proposition. Lastly, by proactively using networking and partnering as a driver for business model innovation the edtech company also learnt about the needs to locally adapt its business model. National school systems differ, there are regional differences and also differences between municipalities. Schools within the same municipality can have different routines and policies for their procurement of digital education tools. Hence, localized networks and values require locally adapted business models. This mirrors Mason & Spring's (2011) idea of the different 'sites' and 'practices' of business models. Like for this edtech supplier, business models emerge, take on multiple sites and evolve over time. spreading out and being adapted in local networks.

Case studies of EdTech business models and business modelling processes

In this section we present a set of cases of edtech companies and their business models. The aim is twofold: to give illustrations of the great variety of business models that can be found in the edtech sector, and secondly, to illustrate one of our central ideas of this paper; the fact that business models are dynamic and for edtech companies, especially for the majority of the entrepreneurial startup companies, the shaping of business models is often an ongoing process of adapting to local and changing conditions and contexts. The section ends with a note on new, emerging business models in edtech, leading into the final section where focus is set on the next step in the development for both established and new edtech companies when artificial intelligent components are added to the value propositions.

Duolingo: Leveraging AI for Personalized Learning

Duolingo's use of AI to create adaptive learning experiences represents a breakthrough in language education. By analyzing data on learner behavior, the platform continuously adjusts individual learning paths, making education both personalized and accessible. This case highlights how AI can be instrumental in scaling an EdTech product globally while maintaining a high level of engagement and effectiveness. EdTech AI for Business (2023) cites Duolingo's success story as an example of how startups can harness technology to deliver tailored educational content, thereby improving learning outcomes and user retention.

Byju's: Global Expansion through Strategic Acquisitions

Byju's, an Indian EdTech company, has strategically expanded its global footprint through a series of high-profile acquisitions. By integrating companies with complementary technologies and content, Byju's has not only diversified its educational offerings but also broadened its market reach. This approach has enabled Byju's to deliver a more diverse set of learning tools and platforms, catering to a wide range of educational needs and preferences. Their strategy underscores the potential for EdTech companies to grow through mergers and acquisitions, leveraging existing platforms to enhance their product offerings and accelerate international expansion.

Coursera: Partnering with Academia to Offer Certified Learning

Coursera's collaboration with leading universities to offer certified courses online has set a new standard in higher education. By partnering with established educational institutions, Coursera has managed to combine the credibility of traditional academia with the flexibility and accessibility of online learning. This case study exemplifies how public-private partnerships can be structured to facilitate lifelong learning and professional development, meeting the needs of a global learner base seeking to enhance their skills and employability.

Business model shift in EdTech: adapting edtech business models to AI

It is widely agreed that Artificial Intelligence (AI) is a key to delivering online education with the potential to improve, some argue radically improve, learning outcomes. In addition, some argue that another potential value adding component in this

will be an increased cost-efficiency. Customized learning with personalized learning-paths is discussed as a potential value-added component of edtech companies' present and future value propositions. In this final section we elaborate on some of the potential business model consequences of the fact that AI most likely will become - despite widely acknowledged and discussed inhibitors - a central driver for new and adapted business models.

Next, we introduce the topic by presenting five scenarios for applied AI in edtech and how the learning of tomorrow can be shaped by AI. This is followed by a discussion on how AI in edtech can reshape educational economics and business. Finally, we sum some of potential business model consequences of the entry of AI into edtech.

Scenarios for Applied AI in Edtech: Shaping the Learning of Tomorrow

In a bustling classroom in 2040, young Emma excitedly boots up her 'Learning Companion' – an AI-driven device resembling a tablet but with capabilities far beyond what we'd recognize in today's world. As her classmates do the same, the atmosphere is one of eager anticipation. The transition to a learning environment enhanced by AI has transformed the experiences of both students and teachers.

Scenario 1: Personalized Learning Paths

Emma's Learning Companion springs to life, presenting her with a dashboard of subjects. However, these aren't the standard math, science, or history lessons of yesteryear. They're tailored to her unique interests and learning pace. One lesson reads, "The Physics Behind Ballet Movements" - a nod to her love for dance. AI in edtech has made it possible to merge a student's interests with core educational concepts. No longer is learning a one-size-fits-all model. The algorithms behind the scenes assess Emma's strengths, areas for growth, interests, and preferred learning styles. They then curate content just for her, ensuring she's engaged while mastering key skills.

Scenario 2: Augmented Reality (AR) Expeditions

Next on her schedule is an AR expedition to ancient Egypt. Slipping on her AR glasses, Emma is immediately transported to the banks of the Nile. As she explores the pyramids, real-time information panels pop up, explaining the significance of hieroglyphics and the architectural genius behind the structures. For edtech, AR represents a leap in experiential learning. Instead of reading about historical events, students like Emma live them. These expeditions, powered by AI, adapt in real-time, diving deeper into areas where a student shows curiosity and skimming over familiar concepts.

Scenario 3: Teacher's Evolving Role

Across the room, Mr. Hernandez, Emma's teacher, monitors his students' progress. But he's not grading papers or preparing lectures. His new role, in a classroom dominated by AI, is that of a mentor and guide. On his own AI-powered dashboard, he sees that a few students, including Emma, struggled with a recent mathematical concept. The system suggests he host a collaborative problem-solving session. It’s a recommendation based on patterns detected over thousands of similar scenarios - where peer learning proved more effective than individual study. This is the reality for modern teachers. They're no longer the primary source of information but are indispensable in facilitating deeper understanding, fostering collaboration, and ensuring emotional well-being in a tech-centric environment.

Scenario 4: Continuous Feedback Loop

At the end of the day, Emma gets a summary of her progress. It's not a report card, but a detailed feedback loop. She sees where she excelled, areas she can work on, and even gets content suggestions for further exploration. Simultaneously, this data is shared with her teacher and parents. The continuous feedback ensures that all stakeholders in Emma's education - including Emma herself - can make informed decisions and adjustments in real-time.

Scenario 5: Lifelong Learning

Edtech's AI revolution is not confined to the traditional classroom. Older adults, like Emma's grandmother, are using similar platforms for their learning. A module on "Digital Painting for Beginners" or "The Science of Gardening" might be her choice for the evening. The AI-driven model supports the belief that learning is a continuous, lifelong journey, not just a phase of life.

The seamless integration of AI in education has revolutionized the way we perceive learning. The future classroom is a fluid, dynamic, and personalized space. The teacher-student relationship has evolved, and the boundaries of the classroom have expanded beyond physical walls. In this new era, students are not just passive recipients but active participants in their learning journey. Teachers, in turn, are empowered to do what they do best: inspire, guide, and mentor. As AI continues to evolve, its role in edtech promises a future of limitless possibilities for education.

The Business Shift: How AI in EdTech is Reshaping Educational Economics

In the hallways of the future's educational institutions, the whispers aren't just about groundbreaking pedagogical techniques, but also about the shifts in business models prompted by AI in EdTech.

Content Creation and the Age of Dynamic Learning

Once, vast libraries housed textbooks that were the lifeblood of education. Today, traditional textbook publishers face a crossroads. The demand for static information repositories is waning. Instead, the new age beckons for dynamic, AI-driven content that evolves with each learner. The business implication? A pivot from one-off textbook sales to subscription-based or modular content sales models. It's an era where content isn't just sold but updated, personalized, and repurchased.

The Rise of Personalized Learning Platforms

In this brave new world, learning platforms don't offer a one-size-fits-all model. They're personalized, understanding each student's unique needs and adapting content accordingly. Such platforms, ever-evolving and ever-improving, operate best on a Software-as-a-Service (SaaS) model, ensuring consistent revenue streams and higher customer retention.

Hardware's New Frontier: The Classroom of Tomorrow

Remember chalkboards and overhead projectors? Now, envision a classroom equipped with AR glasses and advanced AI-powered tablets. This revolution necessitates a surge in demand for specialized EdTech hardware. Those who manufacture, sell, or maintain this equipment stand on the precipice of a business boom.

The Golden Age of Data

Every swipe, click, or pause by a student feeds vast data repositories. This data isn't just numbers; it's a goldmine of insights. Businesses specializing in educational data analytics can provide schools with tools to understand broader student trends, refine curricula, or even predict future educational needs. It's analytics on steroids, with AI ensuring precision and relevance.

Teachers: The Lifelong Learners

With AI entering classrooms, teachers aren't just educators; they're also students. The role of the modern teacher morphs continuously, necessitating regular training to integrate AI tools seamlessly. This change ushers in a new market for professional development, ensuring teachers aren't left behind in the AI revolution.

Redefining Assessment

Gone are the days of the dreaded final exam. Continuous, AI-powered assessment models are taking root. Companies steeped in traditional testing methods might find themselves at a crossroads. The future belongs to those who can offer dynamic, real-time, AI-driven assessment tools that adapt to each student.

Learning: Not Just for the Young

AI shatters the age-old belief that schooling is reserved for the young. The modern era celebrates lifelong learning. From teenagers to retirees, everyone's a student, creating vast new markets and revenue streams for businesses catering to adult and continuous education.

The Fortress of Data: Privacy and Security

With great data comes great responsibility. The more AI integrates into education, the more data is generated, and the more concerns arise over its security. Herein lies a lucrative niche for cybersecurity firms specializing in EdTech. They're the guardians of this new era, ensuring student data remains sacrosanct.

Collaborative Synergies: The Power of Partnerships

No company is an island in the AI-EdTech landscape. Collaborations are key. Whether it's

EdTech firms partnering with AR developers or schools tying up with AI specialists, the future is about synergistic relationships that offer integrated, tailored solutions.

A World Without Borders: Global Education
AI is the universal language of the future, making global expansion an attainable dream for EdTech firms. As platforms adapt to different languages and cultures, businesses have the opportunity to reach every corner of the globe, forging international partnerships and tapping into previously unreachable markets.

In conclusion: growth of AI based business models in radically changed systems of education
The nexus of AI and edtech might not just be the start of an academic revolution; it implies a business metamorphosis. As learning models evolve, so do the economic models underpinning them. Stakeholders, from publishers to educators to tech developers, are in a process of adaptation. AI in education market is estimated (2023) to expand at over 10% CAGR from 2023 to 2032 "owing to the growing inclination towards personalized learning." [1] The report continues:

"Increasing reliance on technological reinforcement and conventional techniques has rendered traditional education models no longer sufficient to sustain the sector. In order to fulfil the evolving demands of students and educators, edtech startups are transforming and improving the education sphere by disrupting traditional technologies and advancing existing learning methods. As of January 2023, there are 30 EdTech Unicorns worth $89 billion worldwide."

The report states that the growth of the business and expansion of the market can be connected to several market growth drivers, e.g. scaling enhanced teaching efficiency requirements, and the rising importance of data-driven decision making. This creates new market and business opportunities, e.g. increasing demand for intelligent tutoring systems, rising penetration of virtual reality (VR) and augmented reality (AR) in education, and higher adoption of intelligent assessment and adaptive testing. The AI edtech market is expected to continue to be driven by both the large tech giants and a large number of entrepreneurial edtech startups. The 2023 report describes how IBM, Amazon, Google and other giants are shifting their positions in this part of the market: "...These companies are concentrating on the integration of technologies to meet the demand from various geographical areas. In March 2022, Google integrated interactive lessons and real-time feedback into its online learning platform Google Classroom. This upgradation helped the company offer students a more personal learning experience through interactive lessons and real-time feedback...".

At the same time, small edtech entrepreneurs emerge, delivering AI based edtech services and products in different application segments. In this situation of continued growth of the global AI edtech market proactive business modelling processes focused on business model exploration and innovation will (continue to) be a focal challenge and a big opportunity for these companies.

Conclusion:
This paper set out to explore the pivotal research question: What happens to existing EdTech business models and digital value propositions when adding Artificial Intelligence (AI)? Our analysis reveals that AI fundamentally transforms these business models across multiple dimensions. AI-driven personalized learning paths enhance user engagement and learning outcomes, while adaptive content delivery and real-time feedback loops revolutionize educational experiences. These advancements necessitate new business models that leverage AI's capabilities to create, deliver, and capture value in novel ways.

EdTech companies like Duolingo, Biju's, and Coursera exemplify how AI integration leads to scalable, personalized, and globally accessible educational solutions. Duolingo's adaptive learning, Biju's strategic acquisitions, and Coursera's certified online courses illustrate diverse strategies for incorporating AI into EdTech, demonstrating the flexibility and innovation required to thrive in this evolving landscape.

[1] https://www.gminsights.com/industry-analysis/artificial-intelligence-ai-in-education-market

Ultimately, the integration of AI in EdTech compels companies to rethink their value propositions, business models, and market strategies. This transformation is not just about technological enhancement but also about redefining the economic and educational paradigms that underpin the industry. As AI continues to advance, its role in shaping the future of education will only grow, making continuous innovation and adaptation essential for sustained success. EdTech managers must embrace AI to stay ahead, leveraging its potential to drive both educational excellence and business growth.

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