

The four business models for AI adoption in education: Giving leaders a destination for the digital transformation journey

Alex Zarifis
MIS and Management
University of Nicosia
Nicosia, Cyprus
zarifis.a@unic.ac.cy

Leonidas Efthymiou
Management and MIS
University of Nicosia
Nicosia, Cyprus
efthymiou.l@unic.ac.cy

Abstract— *Effective digital transformation requires new technology to work in harmony with the people towards a common goal. All the universities do not have the same capabilities currently across these three parameters and may not be able, or willing, to develop them in the same way. Therefore, several alternative models conducive to digital transformation and AI adoption must be identified. A university must not have to go on this journey without a roadmap. There should be several education business models that optimize AI adoption to choose from. Identifying the destination in advance reinforces the trust between the digital transformation leader and the followers. This research identifies four education business models that are optimized for AI. The first is focus and disaggregate. The second is to keep the existing model but enhance it with AI. The third is an educator expanding beyond their current model and the fourth is a disruptor entering education.*

Keywords—*digital transformation, artificial intelligence, education, business model*

I. INTRODUCTION

Universities, like many other organizations, are going through a disruptive digital transformation referred to as a fourth industrial revolution [1]. The allure of AI and automation, allowing smarter, more responsive and scalable universities is clear. What is less clear is what a university will look like five years into this process. Will it be a better version of what it is today, or will it be a different business model, unrecognizable to us today? This research is informed by the literature on business models and how other sectors of the economy have adapted [2–4]. The discussion has the scope of the whole education supply chain and not just the classroom.

A leader in digital transformation in education may look different in different universities. They might be professors, managers, administrators, business consultants, internal IT experts or external IT experts. The leaders in the universities driving the digital transformation should have a vision of what they want their education business model to look like after the digital transformation. Which processes should be automated, and which should stay as they are? Should they lead with technology or follow? Should they do less, but better, or keep the processes and scope they have today? If a leader has a clear model to work towards, they can achieve this faster, more efficiently and with less friction. Costly diversions, unnecessary meetings, confusion and uncertainty can be avoided. Therefore, the research question is:

RQ: What are the education business models that are optimized for AI?

Many aspects of our personal and professional lives are being augmented by AI embedded in more places and playing a more decisive role. AI is not only increasing in its ability to replace highly skilled experts like managers, insurance underwriters and financial advisors, it is also showing an increasing level of independent thought, often referred to as independent agency. Machine Learning and Deep Learning are increasing independent agency [1, 5]. While independent thought and agency was reserved to the staff of a university and the systems were just tools, we are moving towards a future where a university will learn to live with humans and machines with independent agency.

Digital transformation happens through technology, processes and people. Digital transformation in education involves the adoption of new technologies to transform teaching, the education community culture and whole education ecosystem. Many factors affect the rate of adoption, including an innovation's characteristics and several economic, sociological, organizational, and psychological variables [6]. This process has a higher possibility of success if people are clear on what they are adopting, they understand how they fit into the new model and they find it appealing.

This research identifies four education business models that are optimized for AI: (1) The first is focus and disaggregate, doing less but better. (2) The second is to keep the existing model but make it more efficient with AI. (3) The third is an educator expanding beyond their current model and (4) the fourth is a disruptor entering education. A previous version of this model was extensively validated in the financial sector [7, 8].

The following section gives an overview of the literature that provided the foundation for this research. This is followed by the methodology section that explains how an iterative qualitative case study analysis was applied. The analysis of the interviews with education leaders is followed by the final section the discussion and conclusion where the four education business models optimized for AI identified are discussed.

II. LITERATURE REVIEW

Education is different to other areas in some important ways. The responsibility to educate and inspire a student is different to the relationship most companies have with their consumer. Nevertheless, it is important to look for answers to the challenges of AI and digital transformation both inside of education, and outside in other areas. Therefore, the literature review first covered (1) digital transformation in other areas

and then (2) digital transformation in the whole education supply chain.

(1) Digital transformation in other areas: There are many forms of digital transformation, but two broad categories can be identified: The first is when automation of simple processes is prioritized as this improves the effectiveness of the process. The remaining staffs' role is not changed dramatically by AI. An example is a warehouse. The second form of transformations goes further and AI not only replaces many processes but also informs the others where a human expert is still preferred [4]. Education relies on human experts and the interaction with the student is important to the experience. Therefore, the form of AI adoption in areas where the human expert has a central role, like finance and insurance, are more similar to education.

In finance and insurance the role of digital innovation is accelerating and the terms Fintech and Insurtech are being used increasingly used [4]. Fintech and Insurtech reduce the role of humans and create a new form of company where all the processes happen in real time with no delay [9]. AI, computer vision, robotics, IoT and other related technologies create a smoother more responsive and customized service increasing consumers' expectations [10]. Once the consumer experiences the level of service AI makes possible in one area of their life, such as finance or insurance they expect it in all areas of their lives. While we are in the midst of this turmoil it is hard to identify clear consistent patterns in what is happening but nevertheless a taxonomy of four business models optimized for AI were identified and extensively tested [7, 8]. These models can be adapted for education.

(2) Digital transformation in the whole education supply chain: While some educators are leaders in technology adoption, others are laggards because they value the traditional teaching process in a classroom. In addition to AI's new capabilities, the COVID-19 misadventure showed us that we cannot always avoid change and it is sometimes forced upon us [11]. The increase in the use of distance learning has created a form of delivery more conducive to the use of AI. In most cases, the student interacts more with the system and less with the human educator in this context. For the professors that prefer and are allowed by the circumstances to teach face to face, this pedagogic approach will increasingly take the character of hybrid or blended learning as more digital sources and systems are used [12]. Therefore, both student facing 'front office' and non-student facing processes 'back-office' like accounting and payroll are increasingly digitized and fertile ground for AI enhancements.

III. METHODOLOGY

An exploratory qualitative approach was taken using an iterative case study methodology [13, 14]. Business models were developed and evaluated repeatedly until a taxonomy was identified that was suitable and representative.

First, we identified favorable business models for AI adoption from other industries through the literature review. We adapted the business models to education taking into account the three constructs technology, process and people. Cases of AI adoption in education were evaluated to decide which taxonomy of business models had the best fit with what was happening in digital transformation in education. The within-case analysis was then followed by a cross-case analysis across the three constructs to identify the most significant and decisive similarities and differences.

The business model taxonomy was then evaluated by interviewing several leaders of universities' digital transformation. First the interviewees were asked if the most popular AI applications were compatible with the proposed business models. Secondly, if the leaders found that their vision for the future fits into one of these models, this would be an indication that they are suitable. If the leaders identified additional models not in the taxonomy, then the iterative process would continue, and the new proposed categories would be evaluated. We stopped interviewing new participants when the topics were sufficiently saturated [14].

IV. ANALYSIS

The first stage of the analysis was to ask leaders in academic digital transformation identify the AI applications in education and the second was to ask them if their current work and strategy fitted into one of the business models. They were asked separately about the dimensions of technology, process and people.

TABLE I. AI APPLICATIONS IN EDUCATION (STUDENT FACING)

	AI Application
1	Virtual Worlds or augmented reality with embedded AI
2	Virtual lecturer as an avatar online
3	Robotic lecturer in classroom
4	Bringing together data for a smoother more efficient student experience
5	Customer Relationship Management (CRM) with AI
6	Plagiarism detection
7	Chatbot for solving queries on the website
8	Chatbot used to educate students
9	Automated moderating of online discussion forum
10	Automated grading of assignments (multiple choice, essays etc.)
11	Automated feedback report generation
12	Individualized education based on a specific student's needs

Eight leaders were interviewed. Two had managerial roles in IT departments of universities, five were professors involved directly in the digital transformation of their university and one worked for a large technology company that also offered educational courses. Four were from England, three from Germany and one from Cyprus. Five were male and three were female. One was between 31 and 40 years old, four were between 41 and 50 and three were between 51 to 60 years old.

The typical AI applications in education were identified and divided into student-facing and not student-facing. This is a similar separation to front-office and back-office that is often used for applications. In most cases, the student facing AI applications were either created especially for education or they were highly customized, such as for example a Customer

Relationship Management (CRM) system. In most cases, the AI applications in education that were not student-facing were typical systems used across many different forms of organization. The applications were identified so that a check could be made that the business models that were chosen encompass them. A taxonomy of business models suitable for AI in education would have to cover the typical AI applications in education, otherwise it would not be complete. Seven of the participants did believe the business model taxonomy proposed covered the AI applications currently used in education. One believed there is too much uncertainty around AI in education at this point to be confident about the future. He believed we should wait and see ‘...how it plays out...’.

TABLE II. AI APPLICATIONS IN EDUCATION (NOT STUDENT FACING)

	AI Application
1	Automating basic processes like allocating students to classes and classrooms
2	Automating more complicated tasks like arranging for a student who took a break from their studies to return
3	Improving the quality of information in databases
4	Automated Human Resource (HR) processes
5	Automated IT maintenance and support processes
6	Advanced analytics of structured and unstructured data
7	Marketing applications, like better consumer segmentation based on clickstream on website
8	Advanced physical and cyber security

The second test for the validity of the business model taxonomy was to ask leaders in academic digital transformation if their efforts and strategy fitted into one of the business models. One responded believed that their university’s strategy matches the first model ‘Focus and disaggregate education model (doing less, but better)’, four believed their universities’ strategies match the second model ‘Keep existing education model and add AI’, three identified the third category as the one they were following ‘Educator expanding beyond their current model’ and finally one participant identified with the fourth model ‘The model of a disruptor entering education’. Six of the eight participants agreed that all four categories were valid. One felt that it was too early to predict what universities will look after extensive AI adoption. This participant had considered that their university would fall into the third category and move beyond their current model but he was not sure what their new model would be. He stated ‘...we’re looking at it, trying to keep up with the developments...we will see what other unis do and if works out...’. One participant did not believe AI would cause new entrants into university education because there were already many universities and there were more profitable sectors of the economy that were more appealing.

The interviews support the validity and comprehensiveness of the business model taxonomy as all the

strategies of the leaders interviewed matched one of the four models.

V. DISCUSSION AND CONCLUSION

This research identified four education business models that are optimized for AI: (1) The first is focus and disaggregate. (2) The second is to keep the existing education model but enhance it with AI. (3) The third is for an educator to expand beyond their current model and (4) the fourth is a disruptor entering education. A digital transformation leader in education should chose the one that can be achieved realistically based on the current technology, processes and people they have.

1. Focus and disaggregate education model (do less, better)

In addition to the classroom the successful delivery of education requires a supply chain. With the changes in this supply chain caused by AI an educator can chose to focus on one part of this supply chain. They can focus on the part of the supply chain where their skills are best suited and build ecosystem for the rest. For example, some educators focus on developing and validating degrees but let others deliver them and others focus on student recruitment. One of the characteristics of AI adoption is more scalable operations so focusing on one part of the supply chain may be an effective way to grow the organization, by being a smaller part of something larger.

This model is suitable for educators that do not have advanced capabilities across people, process, and technology or the ability to acquire them.

2. Keep existing education model and add AI

Despite the transformational nature of AI, some universities are keeping their existing model. They use AI to make the existing model more effective without changing it fundamentally. This may involve more back-office AI applications and less student facing applications. If the organization does not adopt standard AI solutions but must adapt them to the education model some in-house AI expertise are necessary. This model shows how the initial and current state of a business model can create a resistance to innovation [15].

The advantage of this model is that the university has control over how data is used and how far AI’s independent agency will be allowed to go. More generally, the university will control what it will look like in the future. This may enable the university to project an image of putting education first, not technology.

3. Educator expanding beyond their current model

In this model the educator takes advantage of new opportunities emerging from AI and digital transformation. The educator keeps their existing part of the education supply chain, but they also add new processes that take advantage of AI to reach more students and more data. They extend their capabilities to utilize AI and other technologies like virtual worlds. Extensive capabilities to develop and customize AI applications are needed. This model requires time and money to improve all three aspects of digital transformation, the technology, processes, and people. We did not find evidence of a clear pivot strategy as the existing processes are not sacrificed in favor of the new ones. Nevertheless this strategy has some similarities to a pivot strategy [15].

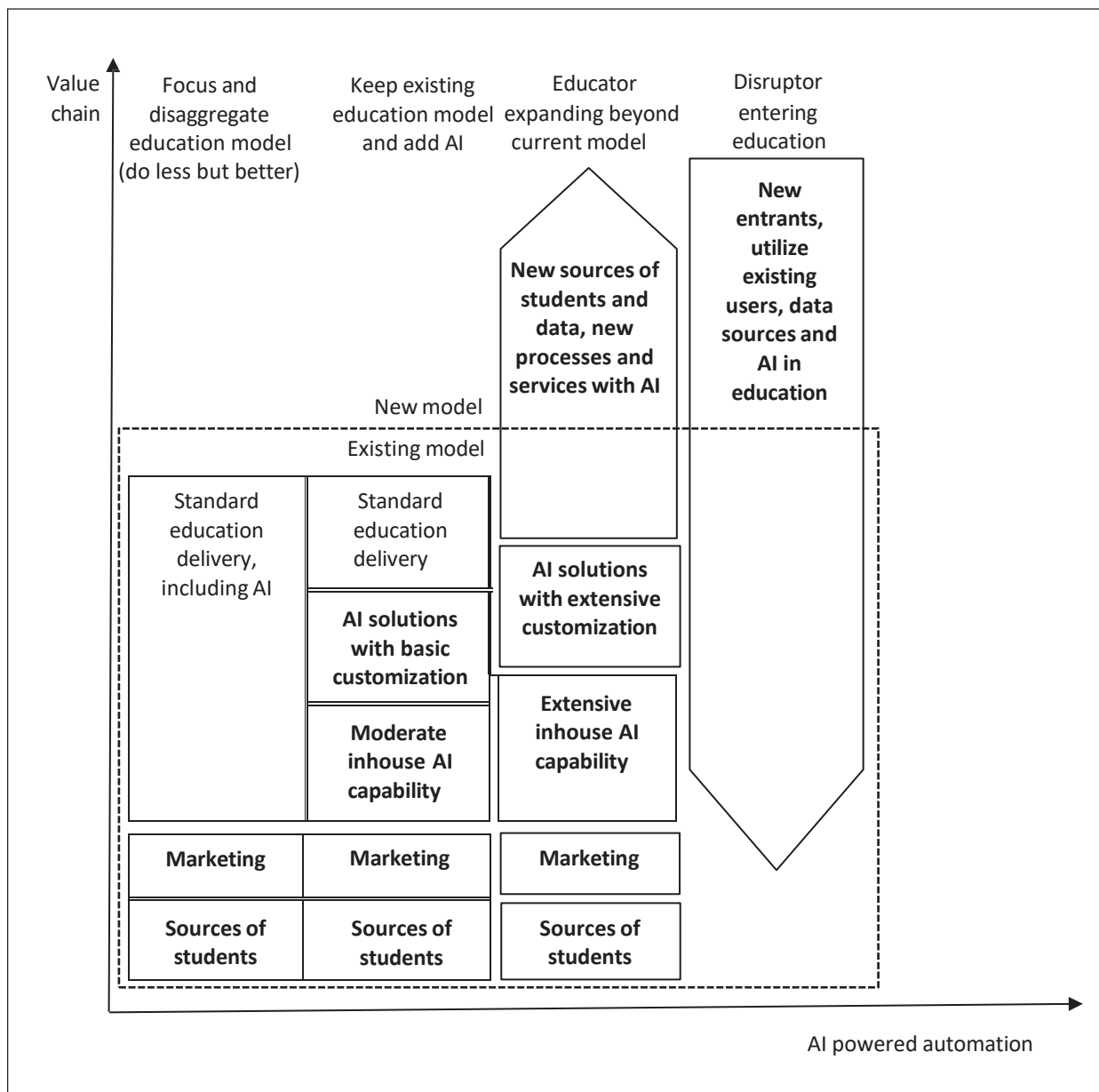


Fig. 1. Four education business models that are optimised for AI
(adaped from Zarifis et al. 2019 [7])

The increased use of technology may also expose the educator to the challenges and controversies of privacy issues [16] and the lack of transparency often involved with AI use [11, 17]

4. The model of a disruptor entering education

As technology plays a more decisive role in many areas [16], including education [17], tech savvy companies can use their advanced systems and existing user base and add other new services. Education can be added as a new feature to a platform in a similar way that banking and insurance services have been added. Companies like Tencent with their 'super-apps' are examples of this [18]. The tech company has the advantage of their technological prowess but does not have the people with the skills and reputation in education.

The four models presented give a strategic direction and make it easier for the leader of the digital transformation to

communicate it. The leader of digital transformation will have to make many choices on the people, processes and technologies along this long journey that we have just started so it is important that all the decisions are compatible with the chosen education business model. For example, the first model will require a strong understanding of the education ecosystem and how to utilize it while the third model expanding beyond the existing model will need extensive technical expertise.

Future research can explore the respective popularity of the four education business models suitable for AI. Additional research should also focus on each of the four education business models identified and explore them in more detail.

REFERENCES

1. van Rijmenam, M., Logue, D.: Revising the 'science of the organisation': theorising AI agency and actorhood. *Innov. Organ. Manag.* 23, 127–144

- (2021).
2. Zott, C., Amit, R., Massa, L.: The Business Model: Recent Developments and Future Research. *J. Manage.* 37, 1019–1042 (2011).
 3. Amit, R., Zott, C.: Creating Value through Business model Innovation. *MIT Sloan Mangement Rev.* 53, (2012).
 4. Alt, R., Beck, R., Smits, M.T.: FinTech and the transformation of the financial industry. *Electron. Mark.* 28, 235–243 (2018).
 5. Kraus, M., Feuerriegel, S., Oztekin, A.: Deep learning in business analytics and operations research: Models, applications and managerial implications. *Eur. J. Oper. Res.* 281, 628–641 (2020).
 6. Rogers, E.M.: *Diffusion of Innovations*. Free Press, New York (1995).
 7. Zarifis, A., Holland, C.P., Milne, A.: Evaluating the impact of AI on insurance: The four emerging AI- and data-driven business models. *Emerald Open Res.* 1, 15 (2019).
 8. Zarifis, A., Cheng, X.: Evaluating the New AI and Data Driven Insurance Business Models for Incumbents and Disruptors: Is there Convergence? *Bus. Inf. Syst.* 199–208 (2021).
 9. Park, Y., Sawy, O.A. El, Hong, T.: Digital Transformation to Real-Time Enterprise to Sustain Competitive Advantage in the Digitized World: The Role of Business Intelligence and Communication Systems. *Korea Bus. Rev.* 24, 105–130 (2020).
 10. Hall, S.: How Artificial Intelligence is changing the insurance industry. *Cent. Insur. Policy Res.* 22, 1–8 (2017).
 11. Cheng, X., Sun, J., Zarifis, A.: Artificial intelligence and deep learning in educational technology research and practice. *Br. J. Educ. Technol.* 51, 1653–1656 (2020).
 12. Xiao, J., Sun-Lin, H.Z., Lin, T.H., Li, M., Pan, Z., Cheng, H.C.: What makes learners a good fit for hybrid learning? Learning competences as predictors of experience and satisfaction in hybrid learning space. *Br. J. Educ. Technol.* 51, 1203–1219 (2020).
 13. Eisenhardt, K.M.: Building Theories from Case Study Research. *Acad. Manag. Rev.* 14, 532–550 (1989).
 14. Miles, M.B., Huberman, A.M.: *Qualitative data analysis*. Sage Publications, Thousand Oaks, CA (1994).
 15. Snihur, Y., Zott, C.: The genesis and metamorphosis of novelty imprints: How business model innovation emerges in young ventures. *Acad. Manag. J.* 63, 554–583 (2020).
 16. Hornung, O., Smolnik, S.: AI invading the workplace: negative emotions towards the organizational use of personal virtual assistants. *Electron. Mark.* (2021).
 17. Sundar, S.S.: Rise of Machine Agency: A Framework for Studying the Psychology of Human–AI Interaction (HAI). *J. Comput. Commun.* 25, 74–88 (2020).
 18. Huang, Y., Miao, W.: Re-domesticating social media when it becomes disruptive: Evidence from China’s “super app” WeChat. *Mob. Media Commun.* 9, 177–194 (2021).