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how the ‘taming’ of private education in China is impacting AI

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Following the theme of this issue of On Education, this paper suggests that one of the most significant and recent examples of ‘taming’ educational technologies occurred in China this year, involving national policy directives aimed at regulating both technology companies and the private education sector. This ‘taming’, it will be argued below, has particular and significant implications for the development of artificial intelligence (AI) for education in China, principally due to the way in which this burgeoning field has developed in relation to private educational provision. The following sections will outline key government policies, and assess the extent to which state regulation is impacting the ways such technologies are designed and deployed in the Chinese education system.

Keywords: AI, artificial intelligence, China, policy, private education

Introduction

The announcement of government policy in China has attracted a lot of attention in western countries, largely due to the perception that such directives, issued by a one-party state, signal imminent and comprehensive change in ways unachievable elsewhere. Additionally, China’s prominence in the global economy, and the substantial international networks of investors involved in Chinese companies, often mean that the promise of impending regulatory shifts becomes mainstream news. Two recent and prominent examples of policy regulation in China illustrate this fascination, and provide crucial insight into the relationships between government policy, AI development, and education. These two policies are: the ‘State Council’s National Strategy for AI Development’ published in 2017, and the ‘Opinions on Further Reducing the Work Burden of Students in Compulsory Education and the Burden of Off-campus Training’, announced in 2021. These two policies are indicative of, firstly, the way that the Chinese state drives AI development through a process of incentivisation, and secondly, the power of the government to apply severe regulations that profoundly impact the ways AI is designed and deployed in educational contexts. In a general sense, the first of the policies identified above signalled a broad authorisation of private sector involvement in the advancement of AI, and can be understood as incentivising specific developments in education. In somewhat of a contrast, the second policy was specifically aimed at regulating private education in China, and given that it is from this sector that the most significant examples of educational AI applications have been developed, the directive can be understood as instigating some potentially fundamental shifts in the ways such technologies are designed and deployed in the Chinese education system. Nevertheless, while both these policies are suggested to be particularly significant, it is with caution that such documents should be seen as straightforward representations of how the field is developing. To assume that Chinese policy straightforwardly

results in uniform and comprehensive national transformation is to overlook, not only the substantial regional differences that exist in the country, but also the less overt interplay between central directives and 'on the ground' local interpretations and implementations, often involving private sector interests.

A 'National Strategy' and the incentivising of AI for education

The 'State Council's National Strategy for AI Development*1*' (hereafter NSAID) (see State Council, 2017) was published in 2017, and made a series of bold claims about the ability to achieve global supremacy and economic might through AI by the year 2030. Perhaps unsurprisingly, the NSAID drew a wealth of media responses and policy analysis, predominantly in the U.S. The narrative of such responses tended towards notions of geopolitical competition through a global 'AI arms race' (Ghi & Srivastava, 2021), characterised by a so-called 'cold war' relationship between China and the US (Thompson, 2018). As such, at least from an outside perspective, the NSAID appeared to establish China as a substantial competitor in an international field of so-called 'AI superpowers' (Lee, 2018), and straightforwardly produce a 'top-down', policy-driven sense of 'national AI capacity'. In contrast, understanding how this policy functioned *within* China is a more productive way of examining the significance of the NSAID, both for the development of such technologies generally, and for the specific impact on education. Rather than understanding the policy in terms of the centralised governance of AI, and indeed notions of national uniformity and coherence which tend to underpin outside assumptions about China, its internal functioning can be understood in terms of *incentivisation*. Roberts et al. make this clear, suggesting that the NSAID 'is not meant to act as a centrally enacted initiative', but rather 'functions as a stamp of approval for de-risking and actively incentivising local projects that make use of AI' (2021, p. 61). They further suggest that the policy is 'an ambitious strategy set by the central government, but the actual innovation and transformation is expected to be driven by the private sector and local governments' (Roberts et al., 2021, p. 61). In this sense, the NSAID can be seen, not as establishing any kind of 'national AI capability' – which Ding and Costigan suggest to be 'such a fuzzy concept' (2019, p. 27), but rather as the attempt to endorse and incite local networks of public and private organisations to independently utilise and produce AI. Nevertheless, the policy is certainly representative of an explicit interest in catalysing technological development in China, and a view within the central leadership that AI offers significant potential for both economic and geopolitical advancement.

Crucially for this discussion, it is through such an understanding that the implications for education become clearer. The NSAID is indicative of a general government position that has established favourable conditions for the development of AI, and the education sector has been perceived as a ripe market for such technological innovation, particularly where start-ups working on educational AI have received tax-breaks from the government and have been seen as a dependable option for investors (Hao, 2019). There are claims that 60 new AI companies established themselves in China's private education market in 2018 alone (see Beard, 2020). Indeed, it is from the private education sector in China – up until recently a substantial and powerful dimension of the Chinese education system in its own right – that the most significant examples of AI in education have derived. For this reason, it is worth briefly noting the history of the private education in China, and its recent shift to online provision. After being re-established following the market reforms of the late 1970s, private education underwent huge growth in the 1990s, responding to a demand for both English language tuition and exam preparation (Lin, 1999). Crucially, this expansion derived, at least in part, from the inability of the public education system to drive the wider economic transformation of the time (see Wang, 2001; Sun, 2010). Further, as Wang notes, private education entrepreneurs were able 'to

experiment with new educational philosophies that would be impossible in the public school system' (2001, p. 108). In describing the recruitment strategies of private education companies during this time, Lin captures the sense of spontaneity and excitement:

> They simply splashed their ads across the streets of the city or set up a booth at a heavy intersection announcing their programs. Adopting a "guerrilla" strategy, they offered whatever was in hot demand…The duration of their programs could be short or long, and classes could be taken during the day or night, all depending on the needs of the clientele. To attract enrollment, they even promised to refund fees if the students were not satisfied' (Lin, 1999, p. 7).

As such, it is important to emphasise the deep-seated sense of entrepreneurialism (see also Tiehua, 1996) that characterises the private education sector in China, and that underpins the more recent development of AI. Further, it is a sector that has been long understood as able to provide innovative educational solutions and practices as alternatives to a more traditional and restricted public education system. Additionally important here is the more recent shift to online provision within the private education sector, where a number of companies have developed online businesses that, while only a small proportion of the sector as a whole, still constitute sizeable educational endeavours, involving tens of millions of students. The significance of the shift online, mirroring the development of AI in other areas, has been that the software platforms used – in this case to facilitate language learning or exam preparation – have allowed their owners to collect vast amounts of data derived from the behaviour of users. With the growing sophistication of 'machine learning' techniques able to make sense of such data (Alpaydin, 2016), online educational platforms have been central in driving the development of AI in China.

Two key examples here are the private education companies 'New Oriental' and 'Tomorrow Advancing Life (TAL)'. New Oriental were founded in 1993 (right in the period of explosive expansion in the private education sector), and, up until recently, claimed to comprise of 122 schools, 1,669 learning centres, over 54,200 teachers, 67.9 million student enrolments, and 11 bookstores (NOETG, 2015). TAL was founded in 2003, and, up until recently, comprised of 45,000 employees and 990 teaching centres (TAL, 2017). TAL is the overarching entity for a somewhat bewildering array of sub-brands and educational products, including Xueersi, Xueersi Online School, Izhikang, First Leap, Tipaipai, Xiaohou AI, Xiaohoucode, Aiqidao, Mamabang, Kaoyanbang, and Shunshunliuxue (TAL, 2017). Not long after the publishing of the NSAID, in October 2018, New Oriental announced two significant AI projects. Firstly, a strategic initiative called 'N-Brain', intended to build cooperative networks across academic research institutions, education technology businesses, and venture capital investors, and secondly, the 'AI Class director', suggested to employ:

> face and speech recognition, facial attributes analysis, natural language processing and other AI tech to track each student's class performance in real time, analyze their emotions, participation and results in a quantitative approach, giving advice accordingly (Qiao Lei quoted in Xu, 2018)

TAL has become a key player in the development of AI in China, not only announcing its own AI

projects, such as the 'AI teacher' aimed at supporting language teaching in under-resourced areas of China (Wang, 2019), but also taking up a central position as a 'national AI champion' for 'smart education' (Larsen, 2019; Wernberg-Tougaard, 2021). In particular, this position situates TAL as a powerful actor across government and the private sector, to set national standards for educational AI development, and ultimately govern the kind of technologies and initiatives that emerge in China. Other notable examples of AI applications include an adaptive learning system developed by Squirrel AI[2] which is deployed across more than 1700 private learning centres in China. The apparent success of Squirrel AI's system has allowed the company to develop into a significant international player, establishing a research laboratory in New York, as well as research collaborations with Carnegie Mellon University and UC-Berkeley[3]. Furthermore, companies such as VIPKid[4] and Yuanfudao[5] demonstrate the relationship between the provision of online education and the subsequent development of AI features, both being businesses that have recently added such technologies to their existing platform-based offerings. Yuanfudao attracted much in the way of media attention in 2020 for reportedly being valued as the 'world's biggest edtech unicorn'; a valuation which appears to be linked to its potential to develop AI from its substantial population of '3.7 million paid student users' (Ghosh 2020, no page).

The key point here is that the companies able to develop prominent examples of AI, as well as adopt influential and authoritative roles within the emerging field, have done so precisely due to already-established positions with the private education sector, involving access to data, infrastructure, capital, and investor networks, as well as the capacity for entrepreneurial development. The NSAID provided the underlying incentive and authorisation for such development to flourish.

The 'Double Reduction' and the 'taming' of the private sector

The powerful position that the private education sector had developed in the previous 30 years of continued market-reforms in China (one estimate is of a sector worth $100 billion – see Bloomberg, 2021a) became the target of stringent regulation in 2021, with the announcement of the 'Opinions on Further Reducing the Work Burden of Students in Compulsory Education and the Burden of Off-campus Training' (MoE, 2021). Published on the 24th of July, and commonly referred to as 'double reduction' (*shuangjian*), the policy detailed a number of regulations regarding the status and practices of private education companies, which many have interpreted as a fundamental overhaul of the sector (for example Che, 2021). Perhaps the most striking aspect of the 'double reduction' was the prohibition of all capital operations. In other words, no private education companies were to be permitted to make profits, and had to further register as non-profit organisations. This was likely the central factor in the widely-reported collapse of the market value of key private education companies. For example, TAL's shares reportedly fell by 70.8%, New Oriental's by 54.2% (E. Cheng, 2021). Nevertheless, there were other notable regulations, such as the barring of foreign investors, which for companies such as TAL and New Oriental who were substantially intertwined within international investor networks, presented significant obstacles to organisational functioning. Other aspects appeared oriented towards regulation of the market, such as prohibiting 'monopolies', restricting advertising, and forcing companies to standardise and make their pricing public (Ma, 2021). Yet further stipulations appear to express a genuine concern for students, through the prohibition of private tuition on weekends and evenings (MoE, 2021). Such regulation acknowledges what has long been considered a highly competitive state education system in China, and the extent to which the private education industry has exploited the anxiety caused by the somewhat infamous Gaokao, or university entrance examination. Haiping suggests that '[t]he average amount spent on extracurricular tutoring per student doubled between 2016 and 2018, to

nearly 5,000 yuan' (2021, no page). As such, Haiping terms the private sector a 'shadow education' in China, that 'exacerbates the problems of the country's test-oriented education system' and is becoming 'a key mechanism for maintaining and reinforcing social classes' (2021, no page). It is important, therefore, to recognise the ways in which AI technologies function to reinforce and maintain the test-oriented education system in China, rather than assuming that the technology is a route to making the Gaokao obsolete, as some AI proponents outside of China have suggested (see Beard, 2020). Ma, (2021) provides a further detailed breakdown of the 'double reduction' regulations, categorised according to whether companies provide exam training or not, as well as whether restrictions apply specifically to online and/or offline provision. This later distinction reveals some interesting foci; for example, while 'training' is prohibited during weekends and holidays for all categories, further restrictions on the length and scheduling of courses apply to online provision exclusively (such courses are limited to 30 minutes, and can be offered no later than 9pm) (Ma, 2021). Notably, despite this latter restriction, the Ministry of Education have themselves pledged to provide free online educational resources nationwide, 'in an effort to ensure education equity for all' (Dandan, 2021a, no page).

At the time of writing, three months since the publication of the 'double reduction' policy, it is as yet unclear how the restrictions outlined above will ultimately impact education in China. Loss of jobs within the sector is one apparent outcome, indicated by the recent announcement of the creation of 10,300 new jobs by city officials in Beijing, ranging across teaching, management, and marketing (Xinyu, 2021), presumably relocating such educational professionals into the state sector. Somewhat bizarrely, New Oriental recently announced plans to develop 'an online marketplace for agriculture products' (Wu, 2021), as a way of making up for the losses incurred by the regulation. There are also indications of a range of 'tactics to avoid scrutiny' (Dandan, 2021b, no page) on the part of private tuition companies, including reducing their size, changing the way the business is registered, or offering classes, ostensibly, to parents rather than their children. More pertinent to this discussion is the potential impact of the 'double reduction' policy on the development and deployment of AI in education in China. Two possible and interrelated outcomes will be suggested here.

Firstly, given the restrictions on the provision of private tutoring, there is evidence that some companies are shifting towards simply supplying AI-driven products, with which students are expected to self-direct their learning. As such, private education companies would avoid the provision of tuition, as they have done previously through dedicated 'learning centres' often involving a combination of class and individual teaching, alongside a one-to-one engagement with AI-driven software. One significant example here is Squirrel AI's announcement of a 'learning machine', in the form of a tablet or computer loaded with the company's adaptive learning system and resources (see Y. Cheng, 2021). Thus, rather than offering their AI technology as part of a broader package of training, usually involving attendance at a specific learning centre and some form of tuition and support from on-site teachers, the 'learning machines' are designed to be products that are sold to customers for their own use. There are indications that the development of dedicated tablets is being adopted by other education companies in direct response to the 'double reduction' policy, such as UMeWorld who provide English language tuition under the brand 'Easy Learn' (see Bloomberg, 2021b). The relatively short time in which such 'learning machines' have been produced and deployed following the recent policy shift may reflect what others have termed 'China speed' (Zhong & Krosinsky, 2020); in part, a reference to the ability to rapidly respond to changing economic conditions, drawing on significant technological infrastructure. Nevertheless, the educational implications of this shift are profound. First and foremost, the assumption that tuition is

not being provided through the selling of computers pre-loaded with AI-driven software reveals significant assumptions about the nature of technology as 'an independent realm of pure technical and scientific law' (Hamilton and Friesen, 2013). In other words, what is substantially overlooked is the idea that tuition is very much in-built within the AI systems used for so-called 'adaptive' or 'personalised' learning, and the notion that data-driven-software is replete with human decision-making. For example, human decision-making about what kind of data is collected, or how user-behaviour is assumed to relate to learning are fundamental, structured-in elements of the ways AI functions. To assume that the independent use of an AI device somehow removes the element of human tuition, derives from a very impoverished, but rather widespread, understanding of the relationships between society and technology. As Bayne suggests, this 'bracketing-off of technology from social activity is expressive of a more fundamental division of society from technology which is widespread within the field of digital education' (2015, p9). Furthermore, this potential shift towards the provision of tablet devices for independent use, as opposed to more integrated arrangements involving both class peers and teachers, appears to further entrench the idea that the learning relationship with AI is 'one-to-one'. As Friesen (2020) has noted, the claim of the advantageous 'one-to-one' relationship with AI is not only widespread amongst advocates of such technologies, but is based on problematic renditions of 'authentic' teaching and learning throughout (European) history. In other words, the educational benefits of a 'one-to-one' relationship with AI, in which students study independently and without any input from trained teachers, or indeed their peers, is highly contested, and appears in the case of recent 'learning machines' in China to be more directly related to the 'double reduction' policy than any particular pedagogical rationale. The provision of contained 'learning machines' seems to not only conceal the continued involvement of human decision-making in the design and deployment of educational AI, but also to reduce opportunities for 'humans in the loop' where learning with such systems take place.

The second, and related, outcome of the 'double reduction' policy is the potential shift of AI-driven systems, away from a previously unregulated private sector, and towards the state school system. Perhaps the most obvious impact of the recent policy shift is that private education companies will have to seek alternative markets, and the public education sector appears as the most immediate substitute, particularly where such companies are able to re-brand themselves as providers of AI products, software, and services. The production of 'learning machines' seems orchestrated with this potential move in mind, where states schools, and in particular those located in under-resourced areas, may see investment in such systems as a viable alternative to a lack of trained teachers. Previously, AI systems, specifically in the area of 'essay grading' have been deployed in state schools in what appears to be an experimental fashion, both in the sense of testing the quality of the technology, as well as in terms of building data-sets from populations of students (Chen, 2018; Ma, 2020). However, despite sizable initiatives – for example an essay grading system deployed in 60,000 schools (see Chen, 2018), such examples of AI have been somewhat confined to particular experimental projects. The 'double reduction', it is suggested here, may lead to a more uniform and more widespread deployment of AI in state schools, as private education companies seek to market specific data-driven products for public educational institutions. Squirrel AI, for example, have offered such services in the past, claiming to have served 60,000 public schools across 1,200 cities (Y. Cheng, 2021). However, it is the combination of recent education policy that suggests the potential for a more substantial shift. Two recent policies published by the State Council are significant here: the 'Education Modernisation 2035 Plan' (State Council, 2019) and the 'Overall Plan for Deepening Educational Evaluation Reform in the New Era' (henceforth DEERNE) (MoE, 2020), both of which emphasise the need for data-driven technologies to underpin the ways schools and universities are developed. Published in 2019, the 'Education Modernisation 2035 Plan', sets out

a broad range of long-term aims, including to 'accelerate educational reform in the information age', through the building of 'smart' campuses and the 'the construction of an integrated intelligent teaching, management and service platform' (State Council 2019, no page). The policy further calls for 'the formation of a modern education management and monitoring system' and the promotion of 'precision management and scientific decision-making' (State Council 2019, no page), alluding to the use of data-driven technologies for education governance. This is emphasised by the DEERNE policy published just a year later, which directly specifies the development of 'modern information technologies such as artificial intelligence and big data' to:

> explore and carry out the longitudinal evaluation of the whole process of students' learning in all grades, and the horizontal evaluation of all elements of morality, intelligence, physical education, and labor. (MoE, 2020, no page).

As such, AI appears to be a significant priority for the state in its efforts to reform public education in China, not only in the sense of the classroom-based 'adaptive' or 'personalised' systems currently developed by private education companies, but also in terms of a broader vision for interconnected platforms and data-driven educational governance. Given the state's previous attempts to amplify 'national AI capability' through the unbridling of private enterprise, such a vision my entail the significant involvement of established education companies and their already-successful technologies.

Conclusions

This paper has examined the extent to which recent policy regulations regarding the private education sector in China may act to 'tame' the development of educational AI. The context for this discussion was the 'State Council's National Strategy for AI Development' published in 2017, which signalled a broad government incentivisation of such technology, and a particular endorsement of the private sector as driving force for the production of AI for education. While private education companies have become central players in the development of educational AI in China, the 'double reduction' policy announced in the summer of 2021 appeared to signal the downfall of the sector, by prohibiting capital operations and banning foreign investors, amongst a raft of other stringent regulations. However, rather than hindering the development of AI in education, the 'double reduction' policy appears to have diverted efforts towards the creation of new kinds of marketable products, and focused more attention on the public education sector. The adoption of more AI technologies in state schools and universities, perhaps supplied or co-developed by existing private education companies, would constitute the most significant impact of the 'double reduction' policy. However, it is important to note that such a move would potentially bring AI systems under more government scrutiny and regulation, as technologies developed in a largely unfettered way for the private sector become increasingly embroiled in regional and national education politics.

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1. Also sometimes translated as the 'New Generation Artificial Intelligence Development Plan'
2. See: http://squirrelai.com/
3. See: http://squirrelai.com/our-story
4. See: https://www.vipkid.com/teach
5. See: https://www.yuanfudao.com/