**Professions in the Age of Information Technologies and Artificial Intelligences:**

**The Case of Medicine, Law and Education in China**

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**Abstract**

In this is article, I examine the possible futures of the professions in China: Will the Chinese professions be able to leapfrog over the professionalism stage and become global leaders in the age of information technologies and artificial intelligences, or will they be crippled by the under-development of professionalism throughout the 20th century? Through systematically reviewing the history and current trends of three professions – medicine, law, and basic education – as case studies, I argue that China may take the global lead in large-scale applications of information technologies and artificial intelligences to replace or enhance the work of human professionals. This is because (1) both the state and the professions in China have stronger incentives to embrace these new technologies due to persistent personnel shortage and failure to provide equitable service to its large rural and poor population; and (2) professionals are less likely to organize against these trends successfully due to the relative weakness and political embeddedness of professional organizations in China. The underdevelopment of professional ethics, however, might cripple China’s attempt at leapfrogging the stage of professionalism. Moreover, the widespread incorporation of information technologies and artificial intelligences will likely make the professions more bifurcated, with the jurisdiction of elite professionals expanding while those of basic-level practitioners shrinking, potentially leading to the deprofessionalization of the latter. As a result, rather than dwelling on the question of whether the Chinese professions will become more like their Western counterparts, observers of the Chinese professions should begin examining how, and with what benefits and costs, China might take the lead in redefining professional work and the organization of professions in the age of information technologies and artificial intelligences.

Throughout the second half of the 20th century, Anglo-American sociologists were preoccupied with the questions of how and why certain professions came into the dominant position that they occupy. From Alexander Morris Carr-Saunders and Paul Alexander Wilson(1933), Talcott Parsons (1938) to Eliot Freidson (2001), sociologists in the U.K. and U.S. developed the traits and eventually the ideal type of professionalism based on the professions that they know: an occupation group obtaining monopoly over a particular area of work based on a body of expert knowledge, complete with licensing laws, self-regulating professional associations and ethical codes. They also studied the process of professionalization, seeking to outline the processes and stages through which occupation groups obtain the prestige and autonomy of professions like American law and medicine (Larson 1977; Wilensky 1964). Some of these writings might even give the impression that professionalism is the ideal and stable end state that all occupation groups are striving towards. As Andrew Abbott wrote in 1988: “The professions dominate our world. They heal our bodies, measure our profits, save our souls.”

Till recently, most of the scholarship on professions examined those in American and European societies. The emergent literature on the professions in China primarily studies individual professions within the professionalization and professionalism framework, debating whether the professions in China have or will move towards the ideal state of professionalism. This orientation is the most salient among those studying the legal profession, whose primary concern is whether lawyers and judges in China will become a dominant and independent profession like their American counterparts and propel China towards the rule of law and perhaps even liberal democracy (W. He 2005; Lo and Snape 2005). Overall, existing research points to two key characteristics that distinguish the Chinese professions from their Western counterparts and disqualifies them from the club of true professions: first, they are products of the superimposition of imported Western models onto indigenous traditions and practices; second, they are highly dependent and embedded in the state, therefore lacking full control over the training, entry, and regulation of their members.

This approach of studying the professions in China, however, is increasingly inadequate for our world today. Even the prototypical professions like law and medicine in the United States are facing serious challenges to their claim to ethical conduct and serving the public good. Susskind & Susskind (2015) warns that the once-dominant professions are about to be remolded and perhaps even replaced by informational technologies and artificial intelligences, and many professions are beginning to feel the threat. The fabled professions of the mid 20th century were clearly not the end of history; it seems increasingly untenable to limit our imagining of the future professions to the image of American doctors and lawyers in their golden ages.

Accordingly, in this paper I explore the possibilities of the future of Chinese professions: will the Chinese professions be able to leapfrog over the professionalism stage and become global leaders in the age of information technologies and artificial intelligences, or will they be crippled by the under-development of professionalism throughout the 20th century?

To do this, I draw on the functionalist conception of professions that Parsons (1938) pioneered and Susskind and Susskind (2015) revived and modified: professionalism, as a way of organizing expertise in societies, is a (potentially temporary) solution to the problem of human beings’ limited capacity. On this account, because we cannot master all the expert knowledge and skills required to fulfill all of our needs, we need professionals who create, maintain, interpret and apply different bodies of practical expertise. Based on this conceptual framework, I pay particular attention to the challenges in fulfilling their pronounced social function that the Chinese professions face today and the responses to these challenges.

I analyze three relatively well researched professions as case studies: medicine, law, and basic education. I systematically reviewed the academic literature (in English as well as in Chinese) as well as Chinese media coverage of these professions. Although the state of other professions may be quite different from these three, I contend this paper may provide an analytic model that could be used to analyze other professions as well.

My analysis reveals that the professions in China today are the hybrid products of various “Western” models and indigenous Chinese traditions. With the aim of constructing a modern nation state, Chinese elites throughout the 20th century borrowed existing models from a number of developed nations such as Japan, the United States, Germany, and the Soviet Union in developing the professions. To somewhat different degrees, all three professions have been facing tremendous challenge in providing equitable and accessible service to the entire population and maintaining public trust in their ethical conduct and contribution to public good. While these are common challenges for professions around the globe, the problems are exacerbated in China by several factors: the large population size, widening social inequality, the breakdown of social norms and lack of effective regulations in the rapid transition from socialist planned economy to market economy.

Just as the nation state was ­­– often heavy-handedly – involved in the creation of these professions, it plays a crucial role in responding to these challenges through reforming legislations, policies and regulations. Equitable access to quality healthcare, justice and education bears as much – if not more – on the legitimacy of the regime as it does on the legitimacy of the professions. Compared to their American counterparts, both the state and the professions in China have stronger incentives to embrace emergent informational technologies and artificial intelligence in order to deliver better service to its underserved populations. Due to the relatively weaker position of the professions, professionals are also less likely to mobilize successfully to reject artificial intelligences to protect their jobs. As a result, rather than dwelling on the question of whether the Chinese professions will become more like their Western counterparts, I argue that observers of the various Chinese professions should begin examining and with what benefits and costs, China might take the lead in redefining professional work and the organization of professions in the age of information technologies and artificial intelligences.

The following three sections present detailed analysis of the past, present state, and future possibilities each of the three professions: medicine, law, and basic education. Since each of these professions entails various working roles, I focus on the prototypical role within teach profession.

**Medicine**

Despite a long and rich tradition of indigenous medical knowledge and practice, Chinese medical practitioners did not become “professionals” until the 20th century. Early formulations of Chinese medical theory emerged over 2000 years ago, and bureaus controlling the education and examination of elite practitioners serving the emerged in the Song dynasty towards the end of the 10th century (Z. Wang, Chen, and Xie 1999). But at the grassroot level, methodologies and techniques varied greatly; training was informal and far from standardized; providers practiced in informal clinics and lacked any uniform professional identity or organization (Fang 2012; Lei 1999).

In fact, historians argue that the very concept of “Chinese medicine” only came into existence in the 19th century when Western missionary hospitals brought biomedicine to China. It served as an umbrella term for a wide range of indigenous medical practices (Taylor 2004b; 2004a). Professional organizations didn’t emerge until 1929, the height of the Republic of China’s modernization campaigns. Chinese doctors trained in modern biomedicine (mostly in Japan) and working in the emerging modern public hospitals in Chinese cities formed their professional organizations first and organized a rally to abolish Chinese medicine in the name of modernizing medical practice. This incident stimulated the consolidation of the professional identities of Chinese medicine practitioners, the formation of Chinese medicine professional associations, and decades of struggle between the two medical professions for legitimacy and authority (Fang 2012; Z. Wang, Chen, and Xie 1999).

After coming to power in 1949, the communist state promoted the modernization of Chinese medicine through integration with Western biomedicine. It was part of their nationalist vision of mobilizing indigenous wisdom to construct an alternative Chinese modernity (Taylor 2004b; 2004a). Today, most Chinese medicine practitioner work in public hospitals, prescribe Chinese propriety medicine (*zhongchengyao*, drugs that contain both herbal and chemical active components) apart from traditional herbs, and their routine work involves biomedicine based diagnostic tests as well as traditional techniques like sensing the pulse and acupuncture (Karchmer 2010). Although it has been steadily marginalized compared to biomedicine, Chinese medicine is still widely consumed and appreciated in contemporary China, remaining an important part of what Arthur Kleinman calls a “plural medical system” (A. Kleinman 1973; 1978).

This brief history demonstrates the prominent role that the state played in the formation and development of the medical professions in China throughout the 20th century. The state was essential in the building of hospitals, clinics and medical schools as well as the creation of textbooks and exams (Fang 2012; Hsu 2008; Rosenthal and Greiner 1982; Taylor 2004b). In the Republican as well as socialist regime, the medical system and the medical profession were expected to serve the nationalist aim of creating a prosperous modern China. This orientation was perhaps the most salient during the cultural revolution, when the socialist state criticized the capitalist and bourgeois tendencies in the medical profession and launched the “barefoot doctors” campaign to serve the medical needs of the rural poor (Fang 2012; Rosenthal and Greiner 1982). Today, the majority of medical professionals are state-employees working in public hospitals; while the Chinese Medical Doctor Association (CMDA) has taken on an active role in the professional training and building professional identity, it does not have the power to license practitioners, control entry, or advocate for the interests of its members independently as its Western counterparts do (X. Cao 2011).

Despite remarkable improvements and achievements under PRC rule, persistent rural-urban, regional and socioeconomic inequalities in healthcare remain a major challenge for the medical professions in China (T. Wang and Zeng 2015; Yin et al. 2018; Yuan et al. 2013). The growth of the medical profession lagged behind the healthcare needs of the population, with an average of 1.7 physicians and 1.3 nurses for every 1000 people in 2009, significantly lower than those in OECD countries (Qin, Li, and Hsieh 2013). Top-tier hospitals and elite professionals are concentrated in large urban centers on the coast. The physician-to-population in urban China is three times that of rural China (Hou and Ke 2015). The inequality in access is further exacerbated by the gradual disintegration of the social insurance system based on people’s communes and urban work-units (danwei) beginning in the 1980s, which led to rapid rise of out-of-pocket healthcare expenditure. For nearly two decades, the majority of Chinese people were uninsured (Eggleston 2012). “*Kanbing nan, kanbing gui*” (it’s too difficult and too costly to get medical treatment) became a national complaint in the 1990s and grew into a prominent social issue throughout the new century (Eggleston 2012).

The medical profession struggled with erecting sound professional ethics and obtaining public trust under sweeping marketization reforms. Japanese medical professionals’ involvement in biowarfare against Chinese civilians – and the lack of open trials and justice afterwards – left a deep scar in Chinese people’s trust in the modern medical professions (A. Kleinman 2010). Although Western bioethics were taught in medical schools, it was detached from indigenous moral visions and usually treated as merely an “after thought” (A. Kleinman 2010). For the three decades since the 1980s, government funding for health facilities dropped from 50-60% to 10% while user fees and personnel salaries were artificially kept below cost. Under these distorted incentive structures, health facilities and physicians overprescribed drugs and high-tech medical exams to make ends meet (X.-Y. Chen 2007; Cornelius-Schecter 2014; Eggleston 2012; Hsiao and Hu 2010; Ran et al. 2013; Yip et al. 2010). The ascendance of the pursuit of personal wealth as a moral value further eroded the professional ethics, motivating under-paid medical professionals to fend for themselves through kickbacks and bribery (Eggleston 2012).

The result is the commercialization of medical service and devastated trust in medical professionals, evident in frequent reports of violent revenge against medical professionals in cases of unsatisfactory treatment outcome. The rise of violence against medical professionals stimulated defensive medical practice – turning away “high-risk” patients and overprescribing tests and drugs (A. J. He 2014; Z. Xu 2013) – and intensified the shortage of medical professionals, particularly pediatricians (Hall et al. 2018; Hu et al. 2014; Q. Wu, Zhao, and Ye 2016).

As the Chinese state played a central role in the formation of the modern professions as well as the creation of much of its present-day problems, it also takes the primary responsibility in finding solutions. The problem of inaccessible and unaffordable medical service entered the state policy agenda in the 1990s, when marketization reform was going full speed. The state-vs-market debate continued for more than a decade before the state finally shifted its tone in 2009 (Dong and Wang 2007) to advocate for restoring the dominant role of the state and the “public-interest nature of hospitals.” New health insurance schemes were initiated with the aim of achieving universal coverage; public expenditure targeted community healthcare facilities (Eggleston 2012). The outcomes of these reforms, however, are mixed. Public financing for healthcare facilities have been on the rise and out-of-pocket expenditure on the decline; however, the violence against medical practitioners, the shortage of medical professionals as well as the inequality in healthcare access have all persisted (Eggleston 2012; Hall et al. 2018; Q. Wu, Zhao, and Ye 2016).

Both the state and medical profession are looking increasingly to information technologies and artificial intelligences to provide quality medical service at scale. Although information technologies and artificial intelligences are still far from replacing human medical experts entirely, they are beginning to outperform human experts in tasks like interpreting radiological images and diagnosing of certain disease (Hamet and Tremblay 2017; J. He et al. 2019; Jiang et al. 2017). Thanks to more favorable state policy, China is becoming a global lead in the medical application of artificial intelligence (J. He et al. 2019). Medical teams based in Guangzhou, for example, pioneered the development of AI tools that expedite diagnosis and referral of treatable eye diseases and lung conditions (Kermany et al. 2018; Long et al. 2017). In recent years, the AI Ophthalmological Clinic developed by Sun Yat-Sen University Ophthalmological Center has been deployed in multiple community health facilities in Guangzhou and have begun to serve remote rural communities in Xinjiang, Tibet, Yunnan, and Qinghai with prevalent eye diseases but few ophthalmologists. The AI Ophthalmological Clinic is capable of screening a wide range of blinding but treatable eye diseases through eye images that can be taken at basic community clinics. The AI system sends results to low risk patients through the mobile application Wechat directly, whereas high-risk cases are sent to ophthalmologists for remote diagnostic review and possible treatment (SYSU Yat-Sen Ophthalmological Center 2019).

The Chinese chest pain center movement led by cardiologists is another case in point. In 2012, a small group of Chinese cardiologists built the first Chinese chest pain center. The regional collaborative rescue model that they developed improved upon the American model: it utilized bluetooth technologies and mobile Internet to allow for remote diagnosis and between-hospital triage through real-time electrocardiogram data when the patient is still on the ambulance (Xiang and Yi 2017). This streamlined procedure reduced misdiagnosis as well as delays caused by transportation to and from hospitals without sufficient treatment capacity, reducing the in-hospital mortality rates of patients with several cardiovascular conditions by half (Xiang and Yi 2017). To scale the model nationwide, this group of entrepreneurial medical professionals mobilized their professional organizations, actively sought the support of government officials, and advocated for new regulations (Huo and Ge 2016; Xiang and Yi 2017). According to the official website of the Headquarter of Chest Pain Centers (<http://www.chinacpc.org/>), by 2019, the movement had led to the establishment and accreditation of over 1,000 chest pain centers across the country.

Innovations like this are spearheaded by entrepreneurial medical professionals, supported by engineers, backed by large sums of government research funding and supportive government policies, and extolled in official media and in national ceremonies. These innovations are beginning to change the medical profession in fundamental ways: on the one hand, elite professionals are enjoying expanding opportunities of developing medical technologies and extending their expertise to help patients on the other side of the country; on the other hand, the emergent information technologies and AI systems are reducing the level of expertise expected of basic-level practitioners working in community health facilities. Although some observers might worry that the latter trend would lead to the “de-skilling” or even replacement of basic-level practitioners, this does not seem like a major concern among Chinese medical professionals. When personnel and expertise shortage is so pressing and persistent, these technological innovations seem like much-needed help rather than threats to job security.

**Law**

China’s indigenous legal tradition bears little resemblance to the modern Anglo-American legal profession. Although laws and courts existed across centuries, they were administered by generalist scholar-officials; these scholar-officials were selected through the Civil Examinations and trained in Confucian classics and literature without systematic study of legal codes; moral, social and political considerations drove court decisions as much as legal considerations did (W. He 2005; Weber 1951). Mediation by respected elders and authorities, not litigation, was the preferred route of dispute resolution, and the Confucian idea of ruling by morality to create social harmony was seen as superior to the Legalist idea of ruling by laws and punishments (Bee Chen Goh 2002; W. He, Thornton, and Li 2012).

The transformation of this indigenous legal tradition began in the 19th century, when increasing encounters and concomitant conflicts with Western countries brought numerous legal disputes and mounting Western dissatisfaction with the Chinese legal system. Legal reform officially started in 1901, when the Qing court signed a treaty with the U.K. agreeing to a thorough reform of its laws and legal procedures to make it more comparable to those in Western countries (W. He 2005). In the following three decades, a nascent legal profession emerged as the court half-heartedly modernized its laws, missionaries and universities started legal education, and a growing number of legal practitioners participated in resolving legal disputes involving foreigners (W. He 2005).

These developments, however, were disrupted first by the Sino-Japanese war and then by the civil war. After the communist party came into power in 1949, it set out to build a socialist legal system, based on the Soviet model, that uses rule by law as tool to accomplish socialist aims (W. He 2005; Lo and Snape 2005; Shelley 1991). During the cultural revolution, law was seen as representing bourgeoise interests and was basically discarded (W. He 2005).

After Deng Xiaoping revived the goal of constructing a socialist legal system, the newly restored Ministry of Justice led a series of initiatives aiming at developing the Chinese legal profession. Law schools and legal education departments were established and expanded; national licensing exams and codes of ethics were created; the number of lawyers grew from 3000 in the three decades between 1950 and 1980 to over 150,000 in the 2000s; state-owned legal advisory offices were opened to provide legal services and were later converted into private practices; lawyers associations were created and granted partial autonomy to govern the profession alongside the MOJ (Alford 1995; Liu 2011; Lo and Snape 2005; Michelson 2012; O’Brien 2011). The legal system and profession emerging out of the reform period has absorbed various Western influences from Marxism to Continental legal code to Anglo-American common law practices and bears little trace of China’s indigenous traditions (W. He 2005; W. He, Thornton, and Li 2012; Lo and Snape 2005).

Despite these “Westernizing” or globalizing trends, the legal profession in China still differs from its Western counterparts in a significant way: legal professionals and their professional associations are still heavily dependent upon and embedded in the state. It is common knowledge that party leaders can influence court rulings directly, sometimes overriding professional judgments (W. He, Thornton, and Li 2012). Criminal defense lawyers – the part of the legal profession positioned to challenge the state – struggle to carry out their job because the police and procuracy often obstruct the process of meeting with suspects, collecting evidence and obtaining case files. Defense lawyers also face constant danger of being accused of committing lawyers’ perjury – a tactic that the prosecutors routinely use to threaten lawyers (E. Li 2010; Liu and Halliday 2011; McMorrow, Liu, and van Rooij 2017; Michelson 2007). Although local lawyer associations sometimes mobilize to protect lawyers unfairly charged with perjury, in high profile cases they either remain silent or follow the state’s order to prevent its members from mobilizing (Liu, Liang, and Halliday 2014).

In this context, the extent to which a lawyer is embedded in the state – through past experience in state agencies and/or relationships with current officers – to a large extent determines whether she can defend her clients and protect herself effectively (Liu and Halliday 2011; Lu, Trejbalova, and Liang 2019; Michelson 2007). The majority of criminal defense lawyers are seen as “pragmatic brokers” and “routine practitioners” who are primarily interested in economic rewards, with only a minority expressing progressive views and engaging in activism against the arbitrary power of the state (Liu and Halliday 2011; Liu, Hsu, and Halliday 2019; Stern 2017). Ironically, the most effective lawyers are often the unlicensed “black lawyers” – retired judges or justice bureau officials who influence the outcome of particular cases behind the scene through their extensive connections with the courts and the government (Liu 2011).

As a consequence of these and other factors, the legal profession struggles to convince the public that its members can enact a consistent code of ethics and promote justice. To win cases and achieve optimal outcomes for their clients in the Chinese context, Chinese lawyers have to routinely mobilize personal connections (*guanxi*) with authorities and serve as intermediaries for bribes (Alford 2002; Liu 2011; McMorrow 2010; Ding 2011). Legal ethics is a sidelined subject in legal education (McMorrow 2010); regulations of lawyer associations and justice bureaus focus on safeguarding the rule of the state rather than protecting clients (McMorrow, Liu, and van Rooij 2017). Within an institutional framework where lawyers are under enormous economic pressure and receive scant institutional support, the top priority for the vast majority of lawyers is to protect their own livelihood (Liu and Michelson 2010); instead of using law to seek justice for the most vulnerable, they use law as a weapon to screen out the clients who cannot pay or present high-risks and discredit their legal claims (Michelson 2006). Although there is a small group of progressive lawyers advocating for human rights and legal reform, they rarely become well-known among the general population due to state censorship (Liu, Hsu, and Halliday 2019; Stern 2017).

China’s legal profession is also far from providing the entire citizenry with accessible, affordable and equitable legal service. From its inception, Western-trained Chinese lawyers were concentrated in the few large cities on the coast with active business connections to foreign countries. Although the proportion of lawyers in China grew from one lawyer for every 750,000 people in 1986 to one for every 10,000 people in 2009 (which is still much lower than 1:250 in the United States), lawyers become more – rather than less – concentrated in large cities. The proportion of lawyers in Beijing and Shanghai grew from about 10% in 2000 to nearly 20% in 2009 (Michelson 2012). This trend may likely continue, as national surveys reveal that lawyers in small cities want to move to larger ones, and those in large cities want to move to Shanghai or Beijing to improve their own socioeconomic standing (Michelson 2012). University-trained and exam-certified lawyers are basically irrelevant for the vast numbers of rural residents and urban working-class people, who have no means to afford their high fees (Halegua 2008).

Over the years it has been local community leaders and basic-level legal workers (基层法律工作者) – the legal equivalent of bare-foot doctors – who provided conflict mediation and legal services to the population that lawyers failed to serve (Alford 1995; 2010; Michelson 2008). On the one hand, people still preferred to turn to local leaders and authorities rather than to the legal system to resolve disputes (Bee Chen Goh 2002; Michelson 2008). On the other hand, to meet the growing legal needs of rural residents, township-level justice bureaus created basic-level legal workers and the organizations that they work in (legal service agencies) in the 1980s. Despite the lack of formal qualifications and being prohibited from criminal defense, these basic-level legal workers have the advantage of government subsidies, deep embeddedness in local communities, and direct relationship with the justice bureaus and other government agencies. They often undertake administrative tasks within the state at the same time that they provide legal services to individual clients. In the 1980s and 1990s, they surpassed the lawyers both in number and in the amount of issues they dealt with (Alford 2010; Ng and Pan 2017).

At the turn of the 20th century, lawyers made significant progress in lobbying the MOJ to eliminate basic-level legal workers in order to obtain a higher degree of monopoly over legal services (Alford 2010; Liu 2011). While the aggressive regulations between 2002 and 2005 did reduce the number of basic-level legal workers, the movement quickly lost its steam after changes in MOJ leadership. Keeping the basic-level legal workers alongside lawyers is beneficial for justice bureaus at various levels, politically as well as economically. The basic-level legal workers who got pushed out in the early 2000s often continued their practices at various legal consulting agencies registered under the bureaus of commerce and industry (Liu 2011).

The Chinese state seems determined to embrace legal technology to solve the problems with trustworthiness of and access to legal service. In 2017, the MOJ and the Ministry of Science and Technology joined hands to release *The New Plan for National Justice and Administrative Technology Innovation during the Thirteenth Five-Year Planning Period*. The plan calls for breakthroughs in “standardized lawyer services” and “legal service technologies”(MOJ 2017). The state council has already called for the cultivation of a new generation of “law + artificial intelligence talents” (J. Cao 2017).

An examination of the Chinese legal tech startup field echoes this trend. Several fast-growing products feature artificial intelligence systems that perform the routine tasks of entry-level lawyers such as reviewing contracts and identifying relevant laws and prior cases, as well as ones that venture into adjudicating cases (Y. Li 2018; N. Xu 2016; L. Zhao 2017). Online conflict-resolution systems are already common on E-commerce platforms. Although AI systems are not judging cases independently yet, some courts are introducing them as assistive system for human judges to standardize the evidence admission criteria and improve the impartiality of the legal process (L. Zhao 2017).

Observers of the American legal profession seem to share the consensus that human lawyers’ role of connecting to clients and crafting the story most appealing to a jury is unlikely to be replaced by AIs anytime soon (Alarie, Niblett, and Yoon 2018; Bues and Matthaei 2017; Koenig, Oseid, and Vorenberg 2018). But this is hardly comforting for Chinese lawyers who work in a system where storytelling is not the most important competitive edge. The trend of AI taking over entry-level legal workers’ routine tasks like drafting contracts and screening documents already seem inevitable; as legal technologies become increasingly sophisticated, the question is how much expertise-dependent legal work will remain for human lawyers and legal workers in China, apart from serving as power and relationship brokers. Anxiety about losing their jobs to artificial intelligences is palpable in heated debates in online forums of legal professionals as well as professional conferences (S. Chen 2018; Y. Li 2018; Liaodian keji 2018; Lv Toutiao 2017; N. Xu 2016; Yang 2018).

**Basic Education**

Education has existed as a state-dependent profession for several millennia in China, although the nature of educators’ work and the institutions in which they work have gone through fundamental changes. Historians trace the earliest schools (for slave-owners) to the Shang dynasty (1766-1122 B.C.) (Zhenzhou Zhao 2007). By Song dynasty (960-1279 A.D.), China already had a multi-tiered schooling system with a myriad combination of government-run schools and private schools supported by local gentry (Borthwick 1983). Most basic-level schools served the dual function of instilling morality in the masses and helping students prepare for the civil service examination that selected people for officialdom. The school system mainly educated the sons of gentry families, using Confucian classics as the main teaching materials and rote memorization as the primary pedagogy (Borthwick 1983; Cleverley 1991; Elman 1991). Although teachers were respected and expected to be Confucian moral exemplars, there was no specialized training for teaching; many of them were graduates of local or provincial exams who did not obtain official appointment in courts (Cleverley 1991; Elman 1991).

Like medicine and law, the modernization of the Chinese schools started in mid 19th century. By the early 1900s, the Qing court had abolished the 1,300-year-old civil service examination and attempted to build a modern education system that ran on Western calendars and taught modern subjects like math and science alongside Confucian classics in age-segregated classrooms (Borthwick 1983). The Qing court had little success in implementing these plans, however, as it was near financial bankruptcy and staffed its schools with classically trained scholar-officials without knowledge of modern schools. The growth of missionary schools across the country proved more influential in introducing modern schools to Chinese people in this period.

After the collapse of the Qing dynasty, the Republican government replaced classical learning with nationalist ideology in its curriculum, began publishing teacher manuals for textbooks, and built a teacher training system (Zhenzhou Zhao 2007). It aimed to provide universal compulsory elementary education, but the output of its teacher training programs as well as financial capacity lagged far behind this goal. By the end of its rule in 1949, only 25% and 3% of age appropriate children were in primary and middle schools respectively; more than 85% of the population was still illiterate (Cleverley 1991). Because teachers are overwhelmingly underprepared to teach modern subjects, rote memorization dominated most Republican classrooms just like those in imperial times (Cleverley 1991).

In the first three decades of communist rule, educational policy was a tug-of-war between two competing visions: a decentralized, revolutionary, work-study school system run by workers and peasants, versus a centralized, academic and meritocratic school system run by educational professionals. In periods when the latter vision got the upper hand, the government set up a fully funded three-tier teacher preparation system (where primary, junior secondary, and senior secondary teachers were trained in senior secondary-equivalent normal schools, two- to three-year teacher colleges, and four-year colleges respectively), whose graduates primarily served urban schools (Y. Wang and Liu 2005; Zhu and Han 2006). Following the Soviet model, these formal teacher training programs were heavy on disciplinary content but weak on pedagogy and practice (Guo 2005; Zhu and Han 2006). In times when the revolutionary vision dominated, class struggles and industrial or agricultural productions became central activities in schools, and teachers – together with other intellectuals – coming under attack as *petit bourgeoise* (Cleverley 1991; Guo 2005).

It wasn’t until the end of the Cultural Revolution in 1977 that the latter vision decidedly won out. Schooling was again prioritized as crucial for reconstructing and modernizing the nation, and teachers regained their status as workers and intellectuals (Gu 2001). Determined to catch up with the international trend of professionalizing teachers, the state first rebuilt the three-tier teacher preparation system in the 1980s, then upgraded the vast majority of these programs into colleges and universities in the 1990s and established licensing regulations in the 2000s (Liao and Zhou 2018; Y. Wang and Liu 2005; Zhu and Han 2006). To fill the exploding need for teachers during the rapid expansion of nine-year compulsory schooling, the state allowed comprehensive universities to establish teacher training programs as well as numerous alternative teacher certification pathways (Crowley 2016; Liao and Zhou 2018). In 2011, China claimed to have achieved universal coverage of nine-year compulsory education and eliminated illiteracy in the entire population; as of 2018, China had 12.4 million full-time teachers in primary and secondary schools, about one teacher for every fifteen school-age children (MOE 2019; National Bureau of Statistics of China 2018).

The drastic and frequent changes in the state’s vision for education throughout the 20th century produced a large, heterogeneous teaching force without a clear moral vision or coherent body of practical expertise. Every few years – a couple decades at most – political campaigns asked teachers to teach different things for different ends: the examination system and the Confucian vision of the teacher as the moral exemplar in pursuit of knowledge and self-perfection underwent several rounds of fierce attack but is again revived; the Western, progressive vision of the teacher as the pedagogical expert facilitating the child’s intellectual exploration, the revolutionary vision of the teacher empowering and laboring alongside workers and peasants, and the “capitalist” vision of the teacher promoting academic excellence have all gone through several rounds of ups and downs. There was never enough time or resources to get the gigantic base of 12.4 million teachers fully onboard with any one set of moral vision and practical expertise.

Often compelled to teach content that they did not fully understand or agree with, teachers resorted to copying and reading textbooks and lecturing notes provided by authorities from above. In the frenzy of learning from the Soviet model in the 1950s, teachers copied translated Soviet lecture notes onto blackboards, which students then copied onto their own notebooks (Cleverley 1991). Teachers in the 1980s taught in a “virtuoso model” that involved a lot of one-directional lecturing and little interaction with students, in a manner reminiscent of their imperial predecessors (Paine 1990). Despite the shift towards progressive and constructivist approaches in national policies, curriculum and teacher education programs in the 21st century, the traditional “lecture + memorize” pedagogy remains incredibly resilient in most classrooms (Guo 2005; Kayange and Msiska 2016; D. Wang 2013).

Compared to the unequal distribution of doctors and lawyers across the nation, the teacher-to-student ratio is relatively even across the country thanks to the state’s commitment to compulsory schooling. However, staffing rural schools with qualified, capable and committed teachers has been a persistent challenge (Xue and Li 2017; An 2018). Although access to primary schooling grew from 25% in 1949 to 95% in 1976, most of them were part time work-study schools staffed by untrained teachers (Cleverley 1991). The most qualified teachers that rural schools have seen in the 20th century were the urban middle school graduates who got sent down to the countryside for re-education in Mao Zedong’s proletariat revolutionary movements. The decentralizing fiscal reforms and loosening of population control in the 1980s and 1990s aggravated the problems: because teacher salaries fell on the shoulders of township governments, impoverished communities struggled to pay their teachers (An 2018). Many rural and small-town teachers left to pursue better employment opportunities locally or in larger cities; those who stayed usually took on second jobs or started small businesses to make ends meet (Ziqun Zhao and Lu 2007).

As failing rural schools became a national concern, the state initiated another round of fiscal reforms to reduce rural-urban teacher salary gaps and launched several policies specifically targeting rural teachers in the past two decades, including large-scale on-the-job training, tuition-free programs for student-teachers who commit to teaching in rural schools, and special subsidies for teaching posts in remote villages (An 2018; Ye, Zhu, and Lo 2019). On-the-job training, teacher exchange and volunteer teaching programs run by nonprofit organizations were also numerous.

Despite these efforts, the morale of rural teachers remained low due to their positions at the bottom of the state bureaucratic hierarchy as well as the socioeconomic hierarchy. Rural teachers routinely lose high-performing students to better resourced urban schools. Drowning in bureaucratic demands from above, rural teachers were critical about the morally and politically problematic aspect of their workplace (such as producing fake student rosters for inspections) in private conversations but did not have any public spaces to raise or discuss these issues. The only things that teachers could legitimately fight and protest loudly about are matters concerning their self-interest, such as who gets to run and profit from the lunch counter in the school canteen (D. Wang 2013; J. Wu 2016). My own ethnographic fieldwork in another project echoes these accounts, as rural teachers said to my face: “*it’s not that we don’t know how to teach better at all, but teaching is just job that pays the bill for us, not a career*.” (Xiang, unpublished manuscript).

Among the three professions analyzed in this article, teachers (particularly those in rural schools) perhaps feel the most imminent threat of being replaced by informational technologies and artificial intelligences. Until the coronavirus outbreak in 2020, however, it was often private companies rather than the state who stood on the front line of this movement. Programs using live-streaming or multimedia technology to allow students in rural and underperforming urban schools to learn from more qualified teachers have sprung up all over the country. One of these programs – developed by a private company in collaboration with an urban prestigious high school – obtained national fame when the China Youth Paper (CYP, a Communist Youth League newspaper) reported that 88 out of it 72,000 graduates made it to the two universities in China (Cheng 2018). Tomorrow Advancing Life (TAL) – the gigantic Chinese corporation of private cram schools – streams the teaching of its best teachers in large urban centers to its teaching sites in more remote regions and are now trying to sell these resources to public schools. Companies like Yangcong Math – which currently serves over 600,000 children – are producing AI-based interactive online lessons and practice problem sets that can be used for either independent learning or classroom instructions. In 2020, the ongoing quarantines that the state imposed to contain the coronavirus since the end of January has pushed the entire school system to move online. Leading technological companies like Tencent and Alibaba stepped in to provide streaming platforms and online classroom management apps; educational bureaus and schools assembled their best teachers to teach in front of the camera while teachers scrambled to figure out how to manage and supervise their students online.

While we don’t have evidence on whether these technologies are indeed providing vulnerable children with better education, it is clear that these technologies and products are fundamentally redefining the role of schoolteachers. Apart from a minority of elite teachers who are involved in producing online learning materials or creating experiential learning experiences for their elite students with other professionals, most routine practitioners are facing the real threat of losing jurisdiction over the task that had long defined the teaching profession and teachers’ professional identities – giving lectures to introduce students to new knowledge and skills. As reported in the CYP article, some local teacher resisted this change through insisting on assigning their own homework to students, sometimes even resigning from their posts in protest (Cheng 2018).

What would happen to the education profession if these models are adopted more widely? In the most optimistic scenario, it would enable human teachers offline to focus more on building relationships with students and providing individualized support; in the most pessimistic scenario, it would further reduce the professional autonomy and status of most teachers and formally relegate them to the rank of low-skilled, low-status flexible workers at the bottom of the bureaucratic and socioeconomic hierarchy, primarily undertaking administrative and logistical responsibilities like maintaining classroom order and ensuring student compliance. Either way, the education profession is on the eve of fundamental changes.

**Discussion**

Will the Chinese professions be able to leapfrog over the professionalism stage and become global leaders in the age of information technologies and artificial intelligences, or will they be crippled by the underdevelopment of professionalism throughout the 20th century? On the one hand, the preceding analysis reveals that all three professions seem ready to embrace or about to be thrown into the efficiency and scale brought by information technologies and artificial intelligences. Their failure to provide equitable service to China’s large rural and poor populations and to maintain public trust has created strong incentives for the state, private businesses and sometimes professionals themselves to embrace the possibility of using technologies to replace or enhance the work of human professionals. Because the Chinese professions were created by the state and remain heavily dependent and embedded in it without fully autonomous professional organization, Chinese medical, legal and educational professionals are much more limited in capacity compared to their Western counterparts even if they want to mobilize against these changes.

On the other hand, the underdevelopment of professional ethics throughout the 20th century could cripple China’s ambition to leapfrog into the new era. None of the three professions analyzed here have successfully reconciled the sometimes-conflicting ethics of its indigenous predecessors with those embedded in the various imported “Western” and “modern” models to create a coherent ethical vision. Indigenous ethical traditions were attacked and largely abandoned in the fervent pursuit of modernity in the 20th-century but imported Western ethics didn’t fully take hold either. Although replacing human professionals with machines and AI systems could in theory extent reduce bribery and corruption, a robust base of professional ethics is indispensable if China wants to create technologies so constructed or fashioned that behave in an ethical and moral way to benefit rather than harm human beings.

Last but not the least, although it remains to be seen how each profession will evolve, the introduction of information technology and artificial intelligences will likely create new divisions within professions: while a small group of elite professionals could expand their jurisdiction and use their expertise to create new technology-based services, the majority of lower-level professionals may lose jurisdiction over many tasks and experience downward mobility in social status or even deprofessionalization. This would have tremendous implications for social structures and social relations, as professionals have long been considered the core of the stabilizing middle classes in capitalist societies. Therefore, rather than dwelling on the question of whether the Chinese professions will become more like their Western counterparts, observers of the Chinese professions should begin examining how China might take the lead in redefining professional work and the organization of various professions in the age of information technologies and artificial intelligences.

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