On Development of Chinese Talent Cultivation Mechanism in AI Age—From the Perspective of the Washback Effect of College Admission Requirements

Hai-yan LI

East China University of Political Science and Law, Shanghai, China

Qin-hui WANG

Shanghai Open University, Shanghai, China

It is undeniable existence of the backwash effect of college admission requirements (CARs) in each education system of the primary and secondary schools in almost every country in the world, and that the different CARs creates the different model of adolescent development. Through analysis and comparison of the similarities and differences between the Sino-US CARs, this study aims to explore the effective Chinese talent cultivation mechanism (TCM), considering a positive backwash effect of CARs to TCM. The current CARs must be updated with the practice of the 2020 Foundation Plan issued by the Ministry of Education of the People's Republic of China. To achieve effective CARs, the authors propose the holistic evaluation mechanism supervised and inspected by the national professional trust system.

Keywords: college admission requirements (CARs), washback effect, artificial intelligence (AI) age entrance examination to university, talent cultivation mechanism

Introduction

Nowadays, the total score of the Chinese Entrance Examination to universities is the only requirement for most Chinese colleges' decisions in admission. Chinese people have long believed in the thoughts of "the knowledge could improve one's living standard," and for most Chinese people, the entrance examination to universities provides a valuable opportunity for them to achieve this dream. The concept of "knowledge" should be redefined with the development of artificial intelligence. With the issuance of the 2020 Foundation Plan by the Ministry of Education of the People's Republic of China, and the promotion of national online courses, the current college admission requirements (CARs) must be updated with the candidate's comprehensive score added as one of the college admission criteria.

This paper aims to present suggestions on the holistic evaluation mechanism supervised and inspected by the National Professional Trust System. Based on the backwash effect of CARs to talent cultivation mechanism (TCM), the authors probe the role of education in the new TCM.

The following constitutes this study's three research questions:

1. Does the washback effect of CARs to TCM exist?
2. Is it possible to adopt various and comprehensive CARs?
3. What kind of CARs is required in artificial intelligence (AI) age?

Washback Effect of CARs to TCM

Washback Effect

The so-called “washback effect” (also known as “backwash”) is commonly found in the field of language testing. It refers to the impact of major examinations on teachers’ teaching and students’ learning. Hughes (1989, p. 1) emphasized the dual attributes of backwash: positive backwash and negative backwash. Hughes (1993) argued that the impact of examinations involved participants (examinees, teachers, educational administrators, textbook compilers, textbook publishers, etc.), processes (syllabus formulation, textbook compilation, teaching methods, learning strategies, etc.), and outcomes (knowledge and skills acquired). Bachman and Palmer (1996, p. 30) argued that testing can backwash not only individuals, but also the educational system, and even society as a whole.

Examinations, especially those that play an important role in human development, will undoubtedly have an impact on teachers’ teaching and students’ learning. The impact of testing begins with testing itself, but the root of the use of testing results lies in the social and educational system and testing, in turn, has an impact on society, the educational system (macro-level), and the individual (micro-level).

Chinese entrance examination to university has played a very important role in the Chinese talent selection mechanism, which did offer an annual opportunity for most of the Chinese students to access to higher education, with the total score as the ticket to universities. Under the washback of CARs, the educators, the students, even the parents emphasized on the total score of major subjects too much, and the student’s cultivation has become a kind of “score-oriented cultivation,” a common phenomenon existing from primary school, secondary school, to high school in China.

The Status Quo of Chinese TCM Under CARs

Education in China is a state system of public education run by the Chinese Ministry of Education. All citizens must attend school for at least nine years, known as the nine-year compulsory education, which is funded by the government. The “gaokao” is the modern China’s university entrance exam. Somewhat similar to the American Scholastic Aptitude Test (SAT), except that it lasts more than twice as long, the nine-hour test is offered twice a year and is the sole determinant for admission to virtually all Chinese colleges and universities. Students must pass four tests as part of the “gaokao”—this is known as the “3 + X” system. “3” refers to compulsory subjects, including “Chinese, Mathematics, and English,” each of which accounts for 150/750 in total score. “X” means that students can choose, according to their own interests, one subject from either Social Sciences (including Politics, History, and Geography) or Natural Sciences (including Physics, Chemistry, and Biology), which accounts for 300/750 in total score. “Gaokao” directly determines which universities students can go to. To some extent, it determines whether they will become blue-collar or white-collar workers later in their lives.

Under the washback effect of “gaokao,” the Chinese education system is featured as examination-oriented education, which does work smoothly as a kind of talent cultivation. Under China’s College Entrance Examination System, students’ abilities are evaluated through their completion of the test paper, so a student

must be excellent in all the subjects to outshine other candidates in the college entrance examination. How to get a higher score? Accuracy, Accuracy, Accuracy ... It means each Chinese student's endless efforts in memorizing facts, materials, even papers, and accurate standard answers through exercising various kinds of test papers. So, it is not a surprise for the college students felt puzzled and lost confidence when facing daily problems. Under this kind of talent cultivation mechanism, many graduates cannot meet the requirement of employment. "Creativity" is too much for a Chinese college student who has been trained to memorize and seek for standard and accurate answers in their 12 years' studying life.

Besides, working on one's disadvantageous subjects is a common learning strategy for Chinese students, which comes from the well-known principle of "Barrel Management," that is, the capacity of barrel depends on the shortest length of the board. No matter what the students' interests and strengths are, they must work at their weak subject to get a higher total score to meet the requirement of CARs. No matter how hard the students work on their weak areas, they might still face a huge challenge to excel in those areas in the future. However, the limitations of the subjects in the Chinese College Entrance Examination means that those students who excel in one or two subjects cannot exert their advantages in this fierce competition too.

China's current score-oriented education system plays vital role in talent selection, which should not be given up totally, but this system should be updated wisely. The enrollment mechanism of Chinese universities needs to be further improved to affect a positive washback to the national education system. Education systems should be well designed to guide a person's growth through his or her whole life.

The Role of Education in Talent Cultivation Mechanism

Connection Between Creativity and Education

Education has always played a vital role in talent cultivation. Cole, Sugioka, and Yamagata-Lynch (1999) found that the relationship between teachers and students, the non-uniform-standard assessment methods, and encouraging multiple-perspective thoughts are very important to create a creative classroom atmosphere. Fasko's (2001) study found the relationship between creativity and education from pre-school age until the ages of 16 students at the public schools in the United States. Other studies show that there exists a link between creativity and learning. Sternberg, Grigorenko, and Singe (2004) discussed what creativity is, what kind of person possesses creativity, and whether there is any evidence to prove that creativity is domain-specific or general areas.

The Function of Education in Creative Talent Cultivation

Education is not just an issue of teaching what information is necessary, but an issue of exposing students to different solutions that they might use to face the challenges in their future life. The teacher should spare no efforts to ignite the students' creativity instead of making students memorize the data or the factual information only. Students should, surely, be exposed to basic facts, but, what more important is, that they should be trained about how to think critically, but not just being told what fact is. Education is not just about testable facts. It is about life experience and possibilities. Martin Luther King Jr. (1947) said, "Education must enable one to sift and weigh evidence, to discern the truth from the falsehood, the reality from the image, and the fact from the fiction." "The purpose of public education is to help the young to transcend individual identity by finding inspiration in the story of humanity" (Postman, 1995, p. 171).

The Various and Comprehensive CARs

The number of American colleges using Test-Optional Policies (TOPs) in higher education admissions has dramatically expanded in recent years. And these colleges have avoided “one-size-fits-all,” finding varied ways to administer TOPs and experiencing varied outcomes. Much of the momentum around test-optional admission is focused on whether the use of standardized tests (specifically SAT and ACT) unnecessarily truncates the admission of otherwise well-qualified students. In particular, there is concern about whether widespread reliance on the use of these tests in the admission process tends to replicate the status quo in social class and opportunity in American society.

According to the National Association for College Admission Counseling’s (NACAC’s) study, American CARs can be classified as considerable influence, moderate influence, limited influence, and no influence. Based on the 2009-2014 NACAC report, American colleges took academic performance, which includes grades in college preparatory courses, strength of curriculum, standardized admission test scores and grades in all courses, as a considerable influence in their decisions of enrollment. About 80% of colleges rated college preparatory courses as considerably important; 64% colleges rated strength of curriculum as considerably important, and more than 50% colleges took standardized admission test scores (58%) and grades in all courses (52%) as considerably important. Many colleges rated essay, a student’s demonstrated interest, counselor and teacher recommendations, extracurricular activities, and class rank as the moderate influence, which shows more information about applicants’ studies, interests, and personalities. Interview, Advanced Placement (AP), or International Baccalaureate (IB) courses and work experience are considered as the limited influence, which offer detailed information about the applicants. And, the SAT II, and portfolios were rated as lowest, no influence.

In their 2018 study, NACAC received 493 survey responses from the 1,264 institutions that comprise NACAC’s membership of four-year, non-profit, baccalaureate degree-granting institutions. According to the 2018 State of College Admissions Report released by NACAC, the grades (all courses), grades (college prep) are the top influence factors in the admission decision, soaring at 80.9% and 70.8%, respectively. We might conclude that about 20%-30% surveyed American colleges did not take academic performance as a considerable influence in their enrollment. Test scores (SAT and ACT) and strength of curriculum are above 51% as a considerable influence, which also means that there is about 48% of college did not take test scores and strength of curriculum as considerable influence factors.

Table 1

Variety in Admission Criteria of American Universities

	CARs	Weight of influence
1	Grades (all courses)	Considerable influence
2	Grades (college prep)	Considerable influence
3	Test scores (SAT and ACT)	Considerable influence
4	Strength of curriculum	Considerable influence
5	Essay or writing sample	Moderate influence
6	Counselor recommendations	Moderate influence
7	Demonstrated interest	Limited influence
8	Teacher recommendation	Moderate influence

The above table is CARs designed by the authors according to the Academic Factors in Admissions, in

2018 State of College Admissions Report released by NACAC.

According to the 2018 study of NACAC, American officers use several factors to learn more about students' academic potential essay or writing sample (36.9%), teacher recommendation (46.4%), and counselor recommendation (46.1%) were rated as "moderate influence." These factors, along with others, such as students' demonstrated interest might provide admission officers with a more holistic view of students. Besides, there are regulations about the early decision and early action, through which the college admission officers would have some idea of students' interests in certain colleges.

College Admission Requirements in AI Age

The world development lies in the cultivation of excellent talents, and the key to the cultivation of talents lies in the rational development of the education system, which is to be affected by the washback of CARs. Talent cultivation has been a major concern for educators and scholars. Daniel H. Pink (2006) outlined the six fundamentally human abilities, i.e., not just function but also design; not just argument but also story; not just focus but also symphony; not analysis but synthesis; not just logic but also empathy; not just seriousness but also play; not just accumulation but also meaning—that are absolute essentials for professional success and personal fulfillment.

Besides, Li Kaifu (2018) believed that the 21st century no longer needs the obedient, no opinions, hard-working, and persevering blue-collar or white-collar workers of the 19th and 20th centuries, but needs innovative practitioners, cross-disciplinary synthesizers, high emotional quotient (EQ) collaborators, highly effective communicators, loving, active, and optimistic workers. Joseph, Oliver, Shaw, and Wisdom (2006) argued that college graduates who may face a complex world are required to be flexible, adaptable, independent, and innovative. Einstein argued that the school's responsibility is to educate the individual as a free individual, but also to educate them to be part of society (Haselhurst, 2007). Aoun's (2017) study shows that future employment requires the potential employees' abilities to work with machines, work with systems, and work with ideas, as well as critical thinking and systems thinking.

The above studies show that education systems should be designed to nurture the young generation's creativity, imagination, innovation, serving as the main task of higher learning in AI age.

Suggestion on Effective Chinese Admission Requirements in AI Age

According to the 2020 Education Foundation Plan issued by the Ministry of Education of the People's Republic of China, colleges and universities will synthesize examinees' comprehensive scores (the proportion of College Entrance Examination scores shall not be less than 85%) according to the proportion of examinees' achievements in the college entrance examination, the comprehensive assessment results, and the comprehensive quality evaluation, and then enroll them according to the examinees' comprehensive scores from high to low order. Chinese CARs are to be updated from the current score-oriented criteria, as this measure increasingly narrows the assessment of human potential.

The Backwash of Partial TOPs in College Admission to National Education System

The CARs of colleges and universities are moving to "holistic" admissions philosophies, with the examinees' comprehensive scores (the proportion of college entrance examination scores shall not be less than 85%) taken into consideration, according to the proportion of examinees' achievements in College Entrance Examination, the comprehensive assessment results and the comprehensive quality evaluation. According to the

2020 Foundation Plan, the relevant colleges and universities should formulate the criteria of comprehensive quality evaluation of senior high school students, which are sure to influence the learning model of high school students.

The comprehensive quality evaluation should cover not just the students' academic achievement, but also their devotion to the society. Such standard-based evaluations of each student should be used as the basic requirement, with 80% candidates' total score working as the basic line. Among the 80% of candidates whose score is above the basic line, emphasis should be put on their solutions to the social issues, such as environment, technology, industry, agriculture, forestry, fishery as well as education. The relevant papers, essays, experiments, and surveys should be required as the rest of the achievement being taken as a part of comprehensive quality evaluation. Student's strength will be enhanced according to the 2020 Foundation Plan. For a small number of candidates with outstanding talents and performance in related disciplines, relevant colleges and universities can formulate the unique requirements for the examination and the methods and standards for the admission of those candidates.

The backwash of the new requirement of college admission might bring a series of changes for the education system. Students' abilities will be judged by not just test scores, but whether they harmoniously developed with the community and nature, and whether their creativity and ability can contribute to society. The students might focus on not just the accuracy of the answers of test paper, they might devote more time to broaden their horizons and encourage their deep study of certain areas to solve certain problems instead of memorizing facts.

The updated evaluation mechanism of high school surely leads to the reform of the current assessment criteria for schools and teachers, and separate the students' test scores from the assessment system of schools and teachers. Society will not exert pressure on school about the fluctuation of students' scores. The evaluation of schools would be judged by whether the teachers create better conditions for the full development of students, respect students' interests and choices, and explore students' potentials.

Schools will, therefore, stress less pressure on students' academic achievement, and the teacher might do the same to their students. Teachers' attention will, in turn, shift from students' scores to the cultivation of students' personalities as well as their potentials. School teachers might help students tap their strengths, cultivate talents with virtuous development, give full play to students' advantages. The primary, secondary, or even high school teachers tend to explore and cultivate students' potentials in various aspects with their strengths into consideration.

To Build a National Professional Trust System to Strengthen Supervision

National professional trust system should cover every aspect of each citizen. The National Network Registration System should be established as a surplus to the current education evaluation mechanism. A nationwide real-time update of the student file system should be built on the current internet system. The students might update their academic and creative achievement in high school in the past three years, as one of the criteria for comprehensive quality evaluation. Those students with outstanding creativity could access relevant research centers and universities with full scholarships.

While giving more autonomy and flexibility to universities and colleges, we should strengthen supervision and inspection in the process of college enrollment, and effectively guarantee the fairness and openness of the college admission process under the legal system. In the process of enrollment, colleges and universities should

fully consider the candidates' academic and creative achievement, and truly select those talents with excellent quality who can develop in an all-round way under the teaching mode of colleges and universities.

In 2019, China's 90 top universities, including Tsinghua University and Peking University, hold independent admission tests, giving conditional offers to students who exhibit talents or achievements in specific fields so that they may enter the university with lower admission scores about 5-20, with 60 maximums. Those students occupy 5% of the total enrollment of each university which holds an independent admission test. The experience of independent admission test of top universities might be adopted by the other universities and colleges.

The application on-line courses from March to May provide a new possibility to meet the requirements of students, who might choose various online courses and have a part-time job at the same time. The new model of teaching and learning weaken the role of scores and broaden students' vision. They might be able to develop a strength in certain areas outshine their peers, the uniqueness of which might not only broaden the opportunities to work for the society, but also lead the young generation to live a prosperous life to seek their dream instead of their families.

Conclusions

In the coming AI age, robots will grow in and become a part of our lives. Many jobs will be taken by robots. To face this challenge, our education should be updated to cultivate students' creativity. Only by the application of the 2020 Foundation Plan reforming College Entrance Examination System, can the healthy development of the education system be achieved. Therefore, when Chinese CARs focus on not just high academic accomplishment, but also the comprehensive quality of all-round development, the education mechanism in high school would do the same. Hence, the secondary school and primary school would do the same too.

The students trained under such an educational system might not be easily replaced by the robots, as their creativity in finding solutions to challenges, as well as their ability to work with the robots to make the world a better place. Only in this educational system, can the students develop the same pace with the social development. Only by this, can our education systems as well as the young generation survive in the near coming AI age.

References

- Aoun, E. J. (2017). *Robot-proof higher education in the age of artificial intelligence*. The MIT Press.
- Bachman, L. F., & Palmer, A. S. (1996). *Language testing in practice*. Oxford: Oxford University Press.
- Bachman, L. F., & Palmer, A. S. (2010). *Language assessment in practice: Developing language assessments and justifying their use in the real world*. Oxford: Oxford University Press.
- Cole, G. D., Sugioka, L. H., & Yamagata-Lynch, C. L. (1999). Supportive classroom environments for creativity in higher education. *The Journal of Creative Behavior*, 33(4), 277-293.
- Fasko, D. (2001). Education and creativity. *Creativity Research Journal*, (13), 317-327.
- Haselhurst, G. (2007). *Philosophy of education*. Retrieved June 19, 2019, from <http://www.spaceandmotion.com/Philosophy-Education.htm>
- Hughes, A. (1989). *Testing for language teachers*. Cambridge, England: Cambridge University Press.
- Hughes, A. (1993). Backwash and TOEFL 2000 (Unpublished manuscript, commissioned by Educational Testing Service [ETS], University of Reading).
- Lee, K. F. (2018). *AI superpowers: China, Silicon Valley, and the New World Order*. Chicago Houghton Mifflin Harcourt.
- Kohn, A. (2004). *What does it mean to be well educated?* Boston: Beacon Press.

- Marking Caring Common. (2016). *Turning the tide: Inspiring concern for others and the common good through college admissions*. Retrieved June 1, 2019, from <http://mcc.gse.harvard.edu/collegeadmissions>
- Messick, S. (1996). Validity and washback in language testing. *Journal of Language Testing*, 13(3), 241-256.
- National Association for College Admission Counseling (NACAC). (2018). *NACAC's State of College Admission: 2009-2014*. Seattle: Princeton Review.
- O'Brien, L. M. (2005). Social foundations of education and democracy: Teacher education for the development of democratically-oriented teachers. *Educational Foundations*, 33-44.
- Pink, H. D. (2006). *A whole new mind why right-brainers will rule the future*. Penguin Group.
- Postman, N. (1995). *The end of education*. New York: Vintage Books.
- Plato. (1955). *The Republic, Book III 403c*. Penguin Classics.
- Retrieved from <http://gaokao.eol.cn/zhengce/luqu/>
- Retrieved from <https://www.cnn.com/2018/06/07/gaokao-an-exam-today-determines-10million-chinese-students-futures.html>
- Retrieved from <https://news.cgtn.com/news/35456a4e35494464776c6d636a4e6e62684a4856/index.html>
- Sternberg, J. R., Grigorenko, L. E., & Singer, L. J. (2004). *Creativity: From potential to realization*. American Psychological Association (APA).
- Syverson, T. S., Franks, W. V., & Hiss, C. W. (2018). Defining access: How test-optional works. *The National Association for College Admission Counseling*, 3.