Engineering Education Policymaking in Cross-National Context: A Critical Analysis of Engineering Education Accreditation in China

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Abstract

In creating policies that support educating future engineers to meet both domestic needs and enable global mobility, a major strategy used by Chinese policymakers is "policy borrowing." Yet one major challenge with this approach is that Chinese policymakers have not deeply reflected on the cultural differences between China and the countries from which they are borrowing policy. This paper examines a particular aspect of engineering education in China – namely engineering education accreditation – and interrogates China's highly pragmatic approach in developing and implementing accreditation policies. This paper argues that historically this pragmatic approach is best understood in relation to influences from both Confucianism and Chinese Marxism. Additionally, we observe that the pragmatic approach shaped the policymaking process in two ways. First, given the lack of a pre-existing accreditation model, the pragmatic approach served as the basis for the decision to adopt ABET's accreditation framework as an actionable "startup template," but without fully challenging ABET's fundamental ideas, concepts, and assumptions. Second, by comparing policy documents, reports, and commentaries released by CEEAA (Chinese Engineering Education Accreditation Association), ABET, and other related agencies in the United States and China, this paper shows that the pragmatic approach was employed by Chinese policymakers as the basis for making a series of "revisions" to the ABET accreditation process to ensure that the resulting policies are aligned with socialist ideology. The rationale for these revisions is also discussed, including how they are justified from a socialist ideological perspective. Drawing on critical theories of education and related methods of studying comparative education policy issues, this paper points out some important limitations or weaknesses in China's pragmatic approach, such as intercollegiate inequalities, tensions between ideological education and professional education, and challenges to autonomous accrediting. The paper closes with some policy recommendations, including a discussion of historical-cultural factors most salient for engineering education policymaking in the Chinese context. The main audience for this paper includes engineering educators and engineering studies scholars interested in topics such as comparative educational research, engineering education policymaking, and current trends in Chinese engineering education.

Keywords: accreditation, china, comparative education research, culture, engineering education, ideology, internationalization, policy, policymaking

Introduction: The History and Politics of Policy Borrowing in China

Policy borrowing has been a prevailing strategy for reforming education policies in most developing countries, reflecting a more general tendency toward dependence on foreign expertise, information, and financing.[1] As a developing country, China has been borrowing education policies from developed countries since the mid nineteenth century, including in the field of engineering education. In fact, one critical question throughout the modern history of engineering education in China that has invited considerable debate is *whether and how to*

effectively learn from and/or borrow education policies from developed countries, and particularly the United States, Europe, and Soviet Union.

The history of policy borrowing in science and engineering education in modern China largely originated in the mid 19th century, when Confucian reformers first started borrowing policies from European countries and Japan to establish modern engineering schools and curricula.[2] In the first half of the 20th century, Nationalists mainly looked to the United States for education policies, in part due to prevailing political alliances. Then, from the 1950s to the beginning of the Cultural Revolution (mid-1960s), Communists considered the Soviet Union as a successful exemplar in establishing socialist engineering education policies. Mao Zedong also advocated *critically* assimilating Western knowledge and policies. Yet the Cultural Revolution (circa 1966-1976) was a period in which Soviet influences were deeply questioned, and the learning process was suspended because of Mao's self-reliance policy and his critiques of the Soviet model.

Beginning in the 1980s, history started to come full circle as Deng Xiaoping and his successors shifted their attention from the Soviet Union back to the United States and Europe. Today, the United States and Europe remain the two major localities from which China learns about and borrows education policies in general, and engineering education policy in particular. Some of the specific policies and ideas that have been borrowed from the West over the last couple of decades include "engineering with a big E (integrative education)," CDIO (Conceive-Design-Implement-Operate) design initiative, industry-university collaboration, and engineering education accreditation.

The history of policy borrowing in engineering education also helped generate a tension in policy reform. On one hand, as the engineering education system in the People's Republic of China was transformed based on the Soviet model under Mao's rule, a variety of Soviet/socialist influences are still reflected in contemporary training objectives, curricula, pedagogies, and financing. On the other hand, in learning from the Western developed countries (and particularly the U.S.), the type of political philosophy that undergirds much policymaking in many Western democracies – namely liberalism – has been recontextualized in the Chinese context. As a result, lingering tensions between socialism and liberalism pose fundamental challenges to the effectiveness of borrowing "successful policies" and "best practices" from Western countries. In dealing with this tension, China mainly adopts a pragmatic approach to policymaking that accepts what is perceived as *constructive*, while also rejecting and/or rectifying what is viewed as *destructive* in relation to Chinese culture, values, and national development goals. This pragmatic approach to policy borrowing is a process that involves various recombinations of "global forms" (i.e., global/international policies) with locally situated culture, ethics, and politics.

Comparative educationists call this process "glocalization," which occurs when "good policies" are *decontextualized* from their original places and then *recontextualized* in other locales.[3] A typical case in this regard is Deng Xiaoping's creation of the term "socialist market economy with Chinese characteristics (*zhongguo tese shehuizhuyi*)." The purpose of the pragmatic approach is to *creatively* adapt policies originating in other national and cultural contexts to the Chinese context, thereby making them useful and meaningful to China's national development. This paper analyzes how this pragmatic approach is evident in China's processes of borrowing engineering education accreditation (EEA) policy. Although this pragmatic approach has greatly

contributed to the policy innovation processes in China as a developing country, as an approach that is often *overly* pragmatic it tends to simplify differences between China and other countries from which policy is borrowed. This approach may also emphasize some differences while overlooking others. As discussed below, ideological differences are often seen as a matter of prime importance, even though they have not been deeply investigated and comprehended by Chinese policymakers due to their tendency toward more utilitarian and pragmatic approaches.

The Historical-Intellectual Resources of Pragmatic Policymaking: Confucianism and Chinese Marxism

Policy diffusion scholars have identified major incentives, motivations, and assumptions that promote policy transfers and borrowings across countries. As argued by Berry and Berry, there are three basic reasons for policy diffusion between states (i.e., subordinate political entities under a federal system):

- states *learn* from one another as they borrow innovation perceived as successful elsewhere;
- states *compete* with each other, including by emulating the policies of other states to achieve an economic or other advantage, or to avoid being disadvantaged; and
- there is pressure on all states to conform to nationally or regionally accepted standards.[4]

Although Berry and Berry's three reasons are for states (or "provinces" in China), they can also be applied in cross-national context. Like states, countries frequently learn from and compete with one another other, including in matters of education policy. Further, certain education policies and frameworks (e.g., for accreditation) are widely viewed as international standards.

To some extent the three reasons proposed by Berry and Berry may be universalizable across countries, but are also supported, justified, and interpreted by underlying cultural beliefs and values in different national contexts. In contemporary China, the central idea needed to better understand and interpret the three reasons for international policies (including policy borrowing) is pragmatism.[5] To better understand the pragmatic approach to policymaking in China, this paper analyzes the historical-intellectual resources that "nourish" the pragmatic approach. In particular, we argue that the historical-intellectual resources of the pragmatic approach are mainly embedded in two Chinese schools of thought: Confucianism and Chinese Marxism.

Confucianism

When trying to learn modern engineering from the West in the 19th century, Confucian reformers argued that Western engineering could only be served as the *instrument* to promote Chinese values. This pragmatic idea constitutes a very classical theme in Confucianism – "*zhongxue weiti*, *xixue weiyong* (Chinese learning as the essence, Western learning as the practical use)." The Confucian reformers were pragmatic nationalists in the sense that they "wanted to make *selective* use of foreign methods to defeat barbarians (*yiyi zhiyi*)."[6] They advocated selective learning of Western engineering without more generally accepting and embracing associated Western political and social institutions.[7]

This kind of pragmatic approach to learning from the West was later suspended by Mao's self-reliance policy, but then revived after Deng's Reform and Opening-up in the late 1970s and early 1980s. Like Confucian reformers, Deng and his successors were also pragmatists in the sense that they "tried to make China strong by gaining access to the world's most advanced science and technology."[6] However, similar to early Confucian reforms, a major problem with these learning processes was that they tended to be *selective* and *context-independent*. For the most part, Chinese policymakers have paid relatively little attention to the specific social and political contexts in which Western policies were made.

Chinese Marxism

The term "Chinese Marxism" itself represents a kind of "pragmatic borrowing" that combines Marxism as Western political thought with Chinese situations and characteristics. Today, "Sinicizing Marxism (*makesizhuyi zhongguohua*)" is proposed as a major strategy for the development of Marxism in China. As a national ideology, Marxism has been popularized across the country and has become a *practical tool* for most Chinese policymakers and governmental officials since 1949. In learning scientific and technological policies from the West, the Hegelian concept of "*yangqi* (sublation, or *aufhebung* in German)" has also served as a guiding principle. The term "*yangqi*" is pragmatic in the sense that it "refers to the dual process of preservation (*yang*) and negation (*qi*)."[8] According to the Hegelian concept of Western learning, the positive elements should be actively developed and elevated (*fayang*) while the negative elements are rejected and discarded (*paoqi*).

In a 1956 talk given at the National Association of Musicians, Mao drew on such principles as he systematically expressed his attitude toward learning from the West[9]:

> We should graft foreign things onto a basic Chinese stock. They should be cross-bred and combined organically … Not all things Western are good, and it's only the good we should take. We ought to critically assimilate useful elements from the West on our own Chinese foundation. In the assimilation of foreign things, they must be transformed and become Chinese … We ought to study the strong points of foreign countries and use them to sort out and systematize things Chinese, to create things of our own with a unique national flavor. Only thus can we clarify things and make sure that we don't lose our national confidence.

After Deng came into power, the concept of "*yangqi*" was integrated into his pragmatic approach to economic policy development and reform, including as a way to borrow and recontextualize international/global policies. More than Mao, Deng emphasized the *creative* combination of Western knowledge and Chinese situations (ethics, politics, etc.) in solving practical issues. Most remarkably, Deng emphasized the critical adaptation and use of a Western liberal economy for China's development. Yet he also argued that Western learning must maintain and not diminish the leadership of the Communist Party and socialist ideology. Hence, socialist ideology becomes a "baseline" and "yardstick" to evaluate the quality of localizing Western policies.

In summary, both Confucianism and Chinese Marxism support a pragmatic belief that good policies are effective *tools* that can help maintain and promote both Chinese Confucian (cultural) and socialist (ideological) values. Yet the so-called "Chinese values" may also vary in different historical periods and philosophical traditions. In early Confucianism, education policies needed to maintain Confucian values, while in contemporary Chinese Marxism, policy borrowing should promote socialist ideology. Yet both Confucianism and Chinese Marxism reject anything that threatens or does not fit with "Chinese (cultural or ideological) values." Any policy violating Chinese values must to be rectified and adapted to the Chinese moral and political context. Nonetheless, identifying such violations and determining appropriate strategies for rectification or adaptation are often difficult tasks.

Engineering Education Accreditation (EEA) in Cross-National Context

Engineering education accreditation (EEA) serves as a highly relevant and important example of China's characteristically pragmatic approach to borrowing policy, in this case from the U.S. Prior research has revealed considerable similarities in accreditation requirements between China and the U.S., although social competencies in the Chinese accreditation system have been combined with some Chinese characteristics (e.g., a type of cultivation that is intellectually rooted in Confucianism has been embedded as a way of defining the social competencies of students).[10] This revision to ABET's accreditation requirements could be seen as a way in which China pragmatically adapted American standards to the Chinese cultural context.

From a broader social and political perspective, this paper argues that the pragmatic approach shaped the *whole* accreditation policymaking process in two ways.

First, given the lack of a pre-existing accreditation model, the pragmatic approach served as the basis for the decision to adopt ABET's accreditation framework as an actionable "startup template," but without fully acknowledging or challenging ABET's fundamental ideas, concepts, and assumptions. Second, this paper shows that a pragmatic approach was also employed by Chinese policymakers as the basis for making a series of "revisions" to the ABET accreditation process to ensure that the resulting policies are aligned with socialist ideology. The sections that follow highlight some of these revisions by looking more specifically at accreditation agencies, evaluator selection, accreditation procedures, and accreditation criteria. These arguments are developed qualitatively, namely through a systematic and comparative analysis of policy documents, reports, and commentaries released by CEEAA (Chinese Engineering Education Accreditation Association), ABET, and other related agencies in the United States and China.

Accreditation Agencies

In the United States, ABET (formerly Accreditation Board for Engineering and Technology, now officially named ABET, Inc.) is the main accreditation agency for engineering education. It is a nonprofit, non-governmental organization that accredits college and university programs in the disciplines of applied science, computing, engineering, and engineering technology.[11] ABET is governed by 33 member societies, including a wide variety of professional and technical organizations that "represent applied science, computing, engineering, and engineering technology fields."[12]

In 1989, ABET and other accreditation agencies in North America, Europe, and Australasia signed the Washington Accord, an international agreement among bodies responsible for accrediting engineering degree programs. With the goal of increasing the global mobility of engineers, the Washington Accord promotes and verifies the "substantial equivalence" of degree programs accredited by all signatory organizations. Graduates of accredited programs in any signatory country are recognized by other signatory countries.[13] In 2013, China became a provisional member of the Washington Accord. For Chinese government and policymakers, one of the implications of joining the Washington Accord is that China's engineering education has been tentatively accepted by the global community and meets "international standards," with Chinese engineers recognized as potentially competent to work internationally.

Compared to the United States and most signatories in the Washington Accord, China used a pragmatic approach to create what appears to be a "non-governmental" and "independent" accreditation agency, since non-governmental organizations (NGOs) in China must either be affiliated with or supervised by the government. In China, the accreditation agency is called the Chinese Engineering Education Accreditation Association (CEEAA). According to its official website, the CEEAA is the "corporate member of China Association for Science and Technology (CAST)" and "the only legal organization authorized by the Ministry of Education (MOE) that can launch engineering education accreditation."[14] By representing CAST as "the largest national non-governmental organization of scientific and technological workers in China"[15], Chinese policymakers have a *pragmatic* way of projecting to external stakeholders that accreditation activities are somehow "independent." Yet domestically, accreditation activities are organized by the CEEAA, which was initiated by and located in the Ministry of Education.

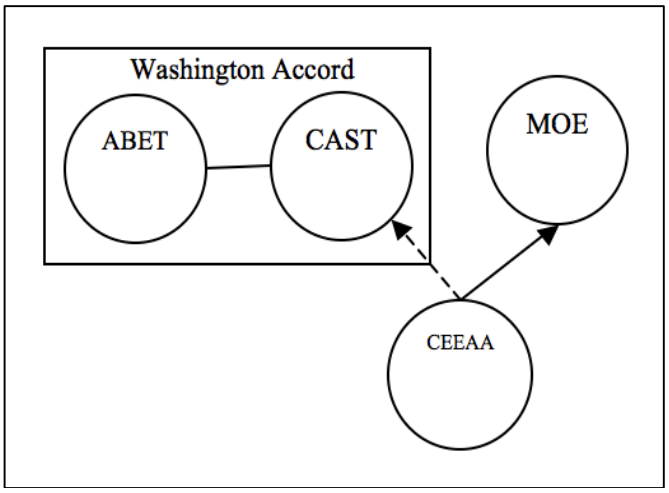

Figure 1. The Governing Bodies of EEA in China

Further, both CAST and CEEAA are GONGOs (government organized non-governmental organizations). Through such a complicated but pragmatic design of the accreditation agency, the Chinese government is able to reach two seemingly contradictory ends. In theory and for international purview, China has what looks like an "independent" and "non-governmental" accreditation agency, seemingly comparable with other Washington Accord signatories. Yet in reality, all domestic accreditation activities must be supervised by the Communist Party and the

government so that all activities are in suitable compliance with socialist ideology, interests, and policies. Hence, CEEAA has a very loose relationship with CAST but a very close affiliation with MOE. Yet the accreditation agencies in other signatories such as ABET do not need to have direct contact with the Chinese governmental body (MOE). Under the Washington Accord, for instance, ABET as a representative agency for the U.S. is officially linked to CAST instead of China's MOE, which actually oversees CEEAA (see Figure 1).

Evaluator Selection

In the United States, the professional and technical societies that govern ABET nominate their members to serve as program evaluators.[16] ABET requires that these evaluators should meet the following minimum qualifications:

> a. demonstrated interest in improving education, b. current member (or willing to join) one of ABET's technical and professional societies, c. formal education and degree appropriate to the field, d. experience with accreditation processes and/or quality improvement processes, e. proficiency using word processing programs, spreadsheets, and PDF files, f. be willing to take the required program evaluator training courses, and g. meet any additional society-specific requirements.[17]

ABET has also built a "program evaluator competency model" to specify the competencies that successful program evaluators exhibit. This model includes six major categories: technically current, effective at communicating, interpersonally skilled, team-oriented, professional, and organized.[17]

In comparison, CEEAA accepted most of the same qualifications/competencies provided by ABET, including six basic qualifications. For instance, similar to ABET, CEEAA requires "accreditation experts" to "know scientific, technological, and engineering advances in their own fields", "have abundant teaching, administrative, and working experience", "have disciplinary background necessary for accreditation", and "have strong working, organizational, and communicative competencies."[17] However, in the "program evaluator competency model", ABET also emphasizes the professional competency of program evaluators, which mainly encompasses professional ethics requirements for program evaluators as "professional peers": "a. conveys professional appearance and demeanor, b. is committed to contributing and adding value to the evaluation process, c. considered a person with high integrity and ethical standards, d. represents ABET and responsible technical society as a practicing professional, e. willing to make observations to stimulate innovation and further the program's efforts toward continuous improvement, f. shows professional respect for institution faculty and staff, g. upholds ABET code of conduct at all times."[18]

In contrast, the CEEAA's *professional* competency is replaced by *ideological* competency. Furthermore, this qualification has been arranged as the first among the six qualifications. More specifically, the ideological competency/qualification requires that accreditation experts need to "uphold the Party's basic line (*jianchi dangde jiben luxian*), uphold socialist principles (*jianchi yuanze*), seek truth from facts (*shishi qiushi*), be fair and objective (*keguan gongzheng*), conduct rigorous scholarship, and be upright in daily behavior (*zuofeng zhengpai*)."[18] The words with

Chinese pinyin in brackets frequently appear in Party documents, including ethical codes for Party members. In China, the government is directly involved in determining what counts as suitable qualifications evaluators. In this sense, CEEAA substitutes *collectivist* socialist ideology for the Western *individualistic* and *liberal* professional ethics in selecting accreditation evaluators. Further, these qualifications are listed first, which helps project their importance.

Accreditation Procedure

Although CEEAA's accreditation procedure is similar to ABET's, as summarized in Table 1, the implementation of accreditation procedure in China has its own unique characteristics. Among these, CEEAA claims that accreditation is voluntary, as in the U.S. Yet arguably the new accreditation system actually represents a kind of "governmental will."[19] In contrast, accreditation pressures at engineering schools in the U.S. and many other countries are primarily linked to market pressures, which are themselves characteristic of neo/liberal policymaking contexts. Hence, accreditation practice in Chinese universities shows how a *global form* (education accreditation) is combined with "other heterogeneous elements in local situations and contexts."[20] As observed by one MOE officer:

> There are a considerable number of universities that are skeptical about the benefits of accreditation for institutions and programs. They may have some misunderstandings. They have overlooked that the essence of the benefits of accreditation for higher education institutions is to promote program development through "external assessment" … Some universities saw accreditation as a project with the MOE label and thought they should do whatever the government mandates. They simply saw "passing accreditation" as the end rather the means for program development.[21]

In this sense, the policy borrowing process in China is a *process of reassembly* as it adds Chinese socialist politics to policies from elsewhere. In practice, changes have been made to the original ABET accreditation procedure so as to maintain the government's power in developing and implementing education policy. That is, Chinese policymakers believe that without centralized administration in guiding accreditation procedures, it is difficult to motivate state-administered universities to participate in engineering accreditation, especially when facing short timelines and considerable overhead in terms of actually carrying out the evaluations.

Table 1. Cross-National Comparison of EEA Terminology and Concepts

ABET Terminology and Concepts[22]	**CEEAA Terminology and Concepts**[23]
Request for Evaluation (RFE)	Application and Acceptance
Self-Study Report	Self-evaluation and the submitting of Self-evaluation Report
	Self-evaluation Report Reviewing
On-Site Visit	On-site Visit
Due Process Response Period	Reviews and Suggestions on Accreditation Decision
Decision and Notification	
Renewal (outside of the accreditation process)	Maintenance of Accreditation Status

Accreditation Criteria

In the CEEAA's accreditation system, accreditation criteria have almost the same structure as ABET's Engineering Criteria 2000 (EC2000) framework. As in the ABET guidelines, for instance, the CEEAA criteria also includes two major parts: general criteria and complementary program criteria. Table 2 compares the structures of the general criteria in ABET EC2000 with the CEEAA criteria. As indicated, the only difference is that CEEAA criteria combine ABET's "general criterion 7" and "general criterion 8" into a single criterion, namely as "1.7 supporting resources."

Table 2. Cross-National Comparison of EEA Criteria

ABET EC2000 General Criteria[24]	CEEAA General Criteria[25]
I. GENERAL CRITERIA FOR BACCALAUREATE LEVEL PROGRAMS	General Criteria
General Criterion 1. Students	1.1 Students
General Criterion 2. Program Educational Objectives	1.2 Educational Objectives
General Criterion 3. Student Outcomes	1.3 Graduate Outcomes
General Criterion 4. Continuous Improvement	1.4 Continuous Improvement
General Criterion 5. Curriculum	1.5 Curriculum
General Criterion 6. Faculty	1.6 Faculty
General Criterion 7. Facilities	1.7 Supporting Resources
General Criterion 8. Institutional Support	

As noted above, the decision to adopt ABET EC2000 as the "startup" template for developing Chinese accreditation criteria is very pragmatic, as China lacked a pre-existing accreditation model. With ABET EC2000 as a "ready-to-use" framework, Chinese policymakers were able to start filling in the template and then see what else they might need as compared to the "standard" ABET framework. This is a very efficient way to imitate current "best practices" in accreditation. However, a negative consequence of this pragmatic approach is that it may tend to lose or overlook some salient Chinese characteristics which do not readily fit into the ABET template. A typical example is that courses originally compulsory courses in many Chinese engineering curricula, such as language and ideological courses, have no corresponding positions within the ABET template. It is expected that sooner or later this problem will create tension between two central government ministries, namely the MOE and the Party's Department of Propaganda (DOP). The latter is responsible for ideological education, and will likely want to expand its power in engineering education, i.e., by adding more ideological topics and courses in accreditation criteria and engineering curricula.

Another issue in borrowing the ABET criteria is that many of the associated concepts were originally derived from the Western professionalism and liberal democracy. In both Confucian and Marxist tradition, it is difficult to find exact counterparts of these concepts. For instance, the current ABET guidelines include eleven learning outcomes that must be met for students in any engineering degree program. One of these, criterion 3.f, more specifically states that graduates must have "an understanding of professional and ethical responsibility."[24] Interestingly, the CEEAA's general criteria include a list of required "graduate outcomes," with the first of these

being "a knowledge of humanities and an understanding of social, professional and ethical responsibility."[25] To begin, it is notable that this outcome includes mention of the humanities, which are not mentioned in the corresponding ABET list. Further, it is symbolically suggestive that this outcome has been elevated to the first position, whereas in ABET is in the sixth spot. This pragmatic change, where humanities knowledge is symbolically prioritized as the highest criterion, likely reflects assumptions among Chinese policymakers that *being a good person* is a necessary prerequisite for *being a good engineer*. In other words, human cultivation is seen as a significant way of training the social competencies of engineering students in China.[10]

As with many of the ABET criteria, the outcome itself is also vague, as it would be very difficult to evaluate "knowledge of humanities" without much further specification. But even more importantly, we argue that the term "professional" has historical and intellectual roots in a Western philosophical tradition. More specifically, the fundamental assumption of Western professionalism is the "individual autonomy" of professionals. However, as argued by Heinz C. Luegenbiehl, "not all societies value moral autonomy to the degree that the U.S. does, and in fact some societies positively discourage it for both their citizens in general and in the workplace."[26]

As will be discussed later, even if the adoption of the term "professional" occurred without much critical reflection or deliberation among Chinese policymakers, it may create potential future tensions between professional education and ideological education in engineering. In fact, in Chinese there is no clear difference between occupation, vocation, and profession, as all three of these English words correspond to one Chinese term, "*zhiye*". Chinese policymakers may assume that all of these English terms are interchangeable. However, profession may be the "best" substitute as it is widely used in the American system, which is in turn considered as representing what counts as "best practice" in engineering education.

Other concepts and ideas in the criteria borrowed from the ABET model also seem to be lacking theoretical background and/or practical experience in the Chinese context. For instance, in the general criteria, the ten "graduate outcomes" include a considerable number of requirements that are new to China's traditional engineering education, such as "social, professional, and ethical responsibilities", "design a system and process within the economic, environmental, legal, safety, health and ethical constraints", working on "teams", "global", and "multicultural context."[25] These requirements are strongly linked to an American or more generally Western historical and cultural context. For instance, terms such as "safety", "global", and "multicultural" may assume a liberal or cosmopolitan view that sees *everyone has the right to freedom, basic health and safety, and equal moral standing*.

Yet largely for historical reasons, engineering education in China continues to reflect both native Chinese and imported Soviet influences, and largely lacks the kinds of pedagogical foundations, engineering curricula, institutional infrastructure, laboratory resources, and faculty resources to support and realize outcomes that initially emerged in a very different national and cultural context. The policy reforms needed to effectively adapt and apply such ideas will likely require incredible pedagogical and institutional reforms in Chinese engineering degree programs.

"Incomplete" Pragmatic Policymaking: Limitations and Weaknesses

According to Mao, when learning from the West, we "must study each side well, the Chinese as well as the foreign. Doing two things by half won't do. We've got to take the two half measures and turn them into two wholes."[9] In this sense, we argue that China's pragmatic approach to developing accreditation policy is "incomplete" and has some lingering limitations and weaknesses. Most remarkably, this pragmatic approach overlooks some key cultural differences between China and the West and thus suggests many potential problems and tensions for engineering education in China. These problems and tensions are illustrated through further discussion of equality between institutions, the selection of program evaluators, teaching professional ethics, governing structure, and pedagogical philosophy.

Intercollegiate Inequalities

As a first challenge and limitation, simply adopting the ABET accreditation model without sufficient consideration of Chinese culture may invite intercollegiate inequalities. In contrast to American universities, all Chinese universities are affiliated with either the central government (specifically different central ministries) or local (provincial or municipal) governments. Since accreditation is administered by the MOE, engineering programs at leading universities affiliated with the MOE are more likely to be selected as the first "experimental sites" for accreditation, while local/provincial schools will likely be overlooked. Meanwhile, universities selected to participate in accreditation will receive more funding from the central government. In fact, nearly all accredited programs to date are in the central government affiliated "key universities (*zhongdian daxue*)."[27] Most of these universities are top engineering schools (either "211" or "985" funded schools, where the "211" and "985" projects are governmental initiatives that aim to build leading research universities) that receive funding directly from the central government.

Like the ABET accreditation system, CEEAA's accreditation attempts to improve the quality of engineering programs. Yet it could be imagined that accreditation will only widen the gap between top central government-affiliated universities that have participated in accreditation and those local/provincial universities not able to. Even if engineering programs at local universities are later permitted to be accredited, some of them may lack resources (financial, expertise, etc.) to conduct educational reforms needed to meet the requirements, which are in part based on an American standard. In turn, e*ngineering graduates from non-accredited programs may be much less competitive in an increasingly competitive job market*, both within China and beyond.

Program Evaluators: Autonomous vs. Relational

As noted above, one fundamental assumption in ABET's accreditation system is professional autonomy. Engineering programs are evaluated by professional peers, who are expected to comply with professional ethics and make unbiased professional judgments. Yet Confucian societies tend to lack this kind of "professional culture." As argued by Joseph R. Levenson:

> One of the outstanding, all-pervasive values of Confucian culture was its anti-professionalism. The Confucian ideal of personal cultivation was a humanistic amateurism, and Confucian education, perhaps supreme in the world for anti-

> vocational classicism, produced an imperial bureaucracy, accordingly, in which human relations counted for more than the network of abstract assignments (just as in Confucian society generally, human relations counted for more than legal relations).[28]

Hence, in a Confucian social and cultural context, human relations might have considerably more weight than professional judgment in accreditation processes. In other words, it will likely be very difficult for accreditation officers and program evaluators to make unbiased professional judgments in the context of what is fundamentally a relational social order. Professional judgments are easily undermined by dense webs of sensitive and complicated relationships.

Still another challenge brought to autonomous accrediting is the dominant role played by the central government (MOE). In fact, one MOE officer has noticed that governmental involvement may be at odds with accreditation experts' judgment and expertise, leading to "organizational chaos."[21]

Education: Professional vs. Ideological

In the United States, ABET's accreditation model emerged from and remains well-aligned with the country's professional culture of engineering. In this sense, engineering education is widely recognized as a kind of professional education. As this brand of professionalism is intentionally and/or unintentionally introduced into China along with the accreditation system, tensions will likely surface between professional education and ideological education. As noted above, for example, the term "professional" has been adopted in the CEEAA criteria. This may create a number of potential problems, such as how engineering ethics is treated.

Unlike in the United States, most Chinese faculty who teach engineering ethics are trained in the humanities and social sciences, and most are familiar with Western culture and values. It may bring an impression to ethics instructors that the government has "endorsed" the instruction of Western professionalism, and this type of professionalism is acceptable to include in engineering curricula – although it is worth noting that there is not yet an accepted national ethics curricula in China. Further, most Western engineering ethics textbooks that have been translated into Chinese reflect a strong professional tradition (e.g., Charles E. Harris et al.'s *Engineering Ethics: Concepts and Cases*[29] and Mike W. Martin and Ronald Schinzinger's *Ethics in Engineering*[30]). Yet these same ethics instructors must also often teach ideological courses such as "*Makesizhuyi jiben yuanli* (Fundamental Principles in Marxism)." Without ethics courses that integrate socialist ideology and Western profesionalism, students may face considerable confusion about the extent to which their education is professional and/or ideological, and whether engineering should first and foremost serve the public as an autonomous profession, or the Party/government as a more indentured technical workforce.

Liberal/Civil Society vs. Centralized Government

As claimed by ABET, academic accreditation in the U.S. is voluntary and decentralized, synergistic with a preference for principles of freedom and federalism in a liberal/civil society context. In borrowing and adapting the ABET accreditation system, Chinese policymakers

similarly claim that accreditation is voluntary. However, because of the deep involvement of the government at least in early periods of accreditation, it is impossible to see this process as completely voluntary. Although some decentralized efforts have been made, education policy scholar Tingting Qi more generally argues that "education decentralization in China remains superficially" and "the seemingly paradoxical mixture of centralization and decentralization is adopted as a strategic imperative."[31]

In this sense, accreditation in China therefore represents a *combination* of "decentralized ideal" and "centralized reality," and tensions between these two very different interpretations have already raised some challenging questions. For example, *who has authority for setting standards and criteria for accreditation? Who makes decisions on accreditation?* And if engineering education is called on to meet human resource needs from industry, *how should the relationship between government and industry be handled*? Further, if accreditation is mainly administered by the government, *how can or should companies get more actively involved in accreditation*?

Education and Pedagogy: Outcome-based/Student-centered vs. Input-based/Teacher-centered

To a large extent, engineering education in the U.S. and many other countries have embraced outcome-based approaches to education, as reflected in current ABET accreditation criteria. By specifying desired outcomes for graduates rather than mandating detailed lists of courses or highly regimented bodies of knowledge, this approach in principles offers greater flexibility in designing courses and curricula, including potential use of more student/learner-centered approaches to instructional design and pedagogy. In light of this, it is perhaps not surprising that active learning techniques have gained considerable prominence in engineering education over the last decade or two.[32]

However, what these trends might mean in the Chinese context remains somewhat unclear. Due to a very deep tradition of Confucian pedagogical culture, Chinese classrooms have historically been dominated by teachers, while students usually play a largely subservient and reactive role. Further, discussions about the so-called "paradox of the Chinese learner" among educational psychology and comparative education scholars has challenged the assumption that student-centered models will be undoubtedly good in China. As comparative education scholar Robert L. Dehaan explains:

> [D]espite large classes, expository instruction, relentless norm-referenced testing, and a teacher-centered classroom climate which, by Western standards, seem not to be conductive to optimal learning, Asian students typically outperform Western students in mathematics and science.[33]

Based on the paradox, some research has also shown that "teacher led" situations may in certain circumstances encourage deeper learning.[34] The paradox is important to engineering education policymakers, practitioners, and researchers both in the West and China, as it seems to challenge constructivist theories (e.g., active learning and cooperative learning) dominant in Western engineering education and it thus invites Western engineering faculty to think about how to better teach Chinese students. It is also significant for Chinese policymakers and educators who have attempted to "borrow" Western constructivist pedagogies as potential "best practices." In

summary, there remains a large and unpredictable challenge whether switching to pedagogical approaches now popular in the West will promote the desired graduate outcomes mandated by the new accreditation criteria. And if student-centered approaches are shown to be better, how to best implement this approach in the Chinese cultural context still remains somewhat unclear.

Conclusion: Where are the Chinese Components in Developing Accreditation Policy?

In summary, this paper interrogates China's highly pragmatic approach in developing and implementing engineering education accreditation policies from the U.S., often without fully thinking through salient cultural differences between the two countries. This paper has also pointed out some key changes made to the ABET framework to comply with socialist ideology.

It might be possible that Chinese policymakers only view borrowing accreditation policy from the Western countries as a *means* to get access to the "global club," i.e., the Washington Accord. Once China is able to "follow" the template provided by ABET, it is very likely to be accepted by the Washington Accord. And once accepted, China may start to develop its own ways of accreditation regardless of these "global standards." This could partly explain why Chinese policymakers have not thought through the cultural differences between the two countries, as they may think getting into the global club is *strategically* more important than dogmatically following the ABET model. If so, this again suggests considerable pragmatism.

Yet if Chinese policymakers do wish to develop accreditation policies that are in line with their cultural and political context, they will need to reflect on the limitations and weaknesses in their overly pragmatic approach. More specifically, they might take a more critical stance and ask: To what extent are these policies successful in other countries? How is the Chinese context distinct from the countries where these policies originally emerged? What are some key foundational assumptions in the Chinese context that may lead various policies to be embraced or resisted? And what cultural factors may cause misunderstandings or misconceptions about these policies, both within China and in China's relations and dealings with other countries?

Given the difficulties in changing the socialist politics and ideology, Chinese policymakers may also need to rethink the role of government (and particularly the central government) in developing education policies, including how to balance centralization and decentralization. In addition, policymakers should reflect on the relationship between government, universities, and industry. On the premise that the role of government is not fundamentally diminished, more industrial voice may need to be heard. At the same time, institutional environments will need to be nurtured to respect autonomous professional judgments made by accreditation experts. And in order to reduce intercollegiate inequalities, more support should go to engineering programs in universities not affiliated with the central government or in low-ranked universities. In general, *the role of government should start to shift from organizer/supervisor to coordinator/facilitator*.

Last but not least, for the wide variety pedagogical assumptions, ideas, and methods embedded in the ABET accreditation system, Chinese policymakers will need to consider if these Western components are *universalizable*, necessary, and/or adaptable in the Chinese context. For instance, they need to explore how to evaluate to what extent constructivist learning theories (e.g. active learning, teamwork) work in a Confucian cultural context in which teachers have more dominant

roles in classrooms. Additionally, professionalism (e.g., professional ethics, professional autonomy) must be critically evaluated as a realistic or necessary component of accreditation criteria and engineering curricula. Without performing such critical interrogations, Chinese policymakers risk projecting an image of engineering accreditation as more image than substance, thereby damaging the global image of its engineering graduates while potentially hampering their local and global mobility.

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