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Setting off the Dominoes: A Theory of Change for Scaled Interdisciplinarity at a Joint Venture Liberal Arts and Sciences University in China

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Huiyuan Ye is a research fellow at Duke Kunshan University (DKU), a Sino-American joint venture liberal arts and sciences university in China. His research interest focuses on the interconnected topics of international higher education (IHE), liberal arts and sciences education (LAS), and education for sustainable development (ESD). In particular, his studies seek to empirically untangle the often ambiguous relationship between interdisciplinarity and learning outcomes. Prior to joining DKU, Dr. Ye had been a visiting scholar at Boston College Center for International Higher Education (CIHE) as well as a researcher of competency-based education at Southern New Hampshire University. Currently He is an Associate Editor of the *International Academic Forum (IAFOR) Journal of Education*. Dr. Ye holds an EdD degree of Higher Education Management from the University of Pittsburgh.

Abstract

Despite a key feature of the Fourth Industrial Revolution and a core strength of liberal arts and sciences education, interdisciplinarity is also a noisy buzzword which does not always make sense from an operational point of view. Traditional interdisciplinary fields take it for granted like fish in the water while, somewhere else, people keep a distance with questions. Promoting

interdisciplinarity faces additional boundary challenges due to strong gravitational forces that are national, historical, and increasingly from between college and workplace. For a higher education institution whose vision for robust interdisciplinarity is rooted across these boundaries, it is not enough to set up a curriculum, hoping that the train of interdisciplinarity will roar on once and for all. In reality, it may take a higher magnitude of interdisciplinarity and constant enabling mechanisms to balance out certain gravitational forces, such as the pro-STEM and pro-exam tendencies in Chinese higher education. This study surveyed the inaugural undergraduate class and faculty of an emerging Duke Kunshan University (DKU) in China to propose a theory of change for scaled interdisciplinarity. The resulting theory of change elaborates on an actionable definition of interdisciplinarity using a vocabulary common to college and workplace, a mobility lens for measuring and leveraging different and especially higher magnitudes of interdisciplinarity, and a linchpin mechanism for energizing this mobility so that interdisciplinarity is more entwined with other institutional facets of teaching, learning, and research.

Summary of the key points:

- This theory of change defines interdisciplinarity with workplace vocabulary as *purposeful socialization of problem-solving*.

- This definition bridges the discourses on interdisciplinarity and learning outcomes.

- This definition enables a perspective of *mobility* for studying interdisciplinarity.

- Leveraging this mobility allows interdisciplinarity to be scaled.

- The missing link in this theory of change is an incentive mechanism.

- This theory of change proposes an incentive mechanism that drives *interdivisional Signature Work co-mentorship*, called *FiFund*.

- This theory of change also addresses gap issues related to Signature Work mentorship as well as the 7-week block schedule and no-class Fridays.

Summary of the key statistics:

- 16 percent of the Class of 2022 (N = 128) had at least one Signature Work co-mentor.

- 30 percent of the Class of 2022 (N = 130) chose an interdivisional Signature Work topic, with 2/3 being supervised by one mentor.

- 27 percent of all faculty from the three undergraduate academic divisions (N = 76) were not Signature Work mentors.

- 27 percent of all Signature Work mentors (N = 55) were co-mentors.

- At least 27 percent of all Signature Work mentors (N = 55) supervised *alone* a project which was interdivisional with his or her expertise.

- 40 percent of the Class of 2022 (N = 119) require funding for their Signature Work projects, with 52 percent of them not knowing where to secure funding and 56 percent expressing difficulties in doing so.

- 49 percent of all faculty from the three undergraduate academic divisions (N = 76) had experience in co-teaching at DKU, 20 percent in Signature Work co-mentorship, and 8 percent in both.

Introduction

> *The Chinese brand of liberal arts and sciences education is scaled interdisciplinarity which counterbalances two gravitational forces of its higher education: pro-STEM and pro-exam.*
>
> –Huiyuan Ye

Enough of the Fuzziness: Defining Interdisciplinarity with Workplace Vocabulary

In January of 2022, the Association of American Colleges and Universities renamed itself as the American Association of Colleges and Universities (AAC&U), marking its progressive global involvement in liberal arts and sciences (LAS) education through member institutions in as many as 25 countries, including China. AAC&U underpinned this expansion with a definition of contemporary LAS education as well as a foresight of significant global workforce trends. While the definition [2] unsurprisingly echoes integrated curriculum and pedagogy, applied experience, and learning outcomes, it is perhaps the learning outcome component that is most intriguing to employers around the world, especially in places nonnative to American LAS traditions (Cheng & Wei, 2021; Godwin & Altbach, 2016; Kirby & van der Wende, 2016; Lin, 2003; Nauffal & Skulte-Ouaiss, 2018; Telling, 2018). Essentially, what differences does LAS education bring to a global workforce being steadily reshaped by the Fourth Industrial Revolution (4IR) which more than ever blends the digital, physical, and biological worlds (Schwab, 2017) and scrutinizes, in educational and work contexts alike, distinct human capabilities vis-à-vis encroaching revolutionary technologies such as artificial intelligence (Luckin, 2018)?

Two lessons from the U.S. are worth mentioning. William Adams, former Chair of the National Endowment for the Humanities, warned of a defense strategy that draws solely upon wide applicability of generic LAS skills and

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[2] AAC&U defines liberal education as "an approach to undergraduate education that promotes integration of learning across the curriculum and co-curriculum, and between academic and experiential learning, in order to develop specific learning outcomes that are essential for work, citizenship, and life" (https://www.aacu.org/trending-topics/what-is-liberal-education).

recommended more definitively interpreting core strengths of LAS education into workplace vocabulary (Adams, 2022). Lynn Pasquerella, President of AAC&U, similarly addressed a persistent lack of common language for stakeholder groups of LAS education in the foreword of a recent AAC&U report on contemporary employer views of highly desirable workplace mindsets and skills in U.S. companies (AAC&U, 2021). More globally and in China, OECD Future of Education and Skills 2030 and New Liberal Arts are respective key initiatives for shaping separate vocabularies towards this common language (Ministry of Education of the People's Republic of China, 2021; OECD, 2019). But where to begin bridging this gap of vocabulary?

One core strength of LAS education is interdisciplinarity which corresponds with the blending nature of 4IR and is also ironically fuzzy in terms of academic practice (Klein, 2008; Klein, 2021), relationship with learning outcomes (Laursen et al., 2022), and workplace interpretations. Very little is known about the latter regarding whether and how employers perceive interdisciplinarity as a valued trait in college graduates. This fuzziness in the educational sphere (vis-à-vis research sphere) of interdisciplinarity is not helped by a number of disparities in the literature on assessing interdisciplinarity. According to two systematic reviews (Laursen et al., 2022; Wagner et al., 2011), research settings, cognitive dynamics, and quantitative approaches dominate the literature compared with, respectively, educational settings, social dynamics, and qualitative approaches. Few approaches exist for judging the effectiveness of interdisciplinary educational programs (Borrego & Newswander, 2010). On the other hand, the aforementioned AAC&U report (2021) shows that taking initiative and teamwork are respectively the most desirable mindset and skill at a workplace increasingly characterized by creative problem-solving. If interdisciplinarity by nature is deliberate, relational, and problem-based (Mansilla & Duraising, 2007), which is generally true, then it is not difficult to see that these three traits correspond very closely with those three workplace mindsets and skills. In other words, for the purpose of bridging this vocabulary gap, interdisciplinarity can be defined using workplace vocabulary as purposeful socialization of problem-solving. This usefully reductive definition speaks to the core strength of LAS education in interdisciplinarity as well as

across educational and work contexts while also drawing upon UNESCO's Education 2030 Framework for Action (UNESCO, 2022). In this framework, interdisciplinarity and interculturality are highlighted as two of the three interrelated themes for the role of higher education institutions in contributing to the Sustainable Development Goals.

Counterbalancing Two Gravitational Forces in Chinese Higher Education

One merit for defining interdisciplinarity as such is, by *socialization*, it allows one to look at it from an alternative perspective which bypasses technical or even esoteric debates concerning integration, including whether an endeavor counts as interdisciplinary, multidisciplinary, or transdisciplinary. This perspective argues that a higher level of interdisciplinarity is characterized by socializing more frequently and/or diversely for academic problem-solving. For example, a biology professor co-teaching with a math professor is likely to be more engaged in interdisciplinarity than a biology professor who never co-teaches, and less so than a biology professor co-teaching with a literature professor. If, at an institution, more faculty members and/or students than before engage in frequent and/or diverse socializations for academic problem-solving, it can be said that this institution is likely to become more vibrant in interdisciplinarity. Let's call the tendency to socialize *interdisciplinary mobility*: The higher the level of mobility, the more interdisciplinary it is likely to be. This concept draws upon a way-of-knowing debate between the mainstream *categorization of knowledge* argument (Grosfoguel, 2013) and the alternative *relationship of knowing* argument (Zanotti & Palomino-Schalscha, 2016) by adopting the latter. Instead of asserting "orderly, monolithic, hierarchical structures" of interdisciplinary *knowledge*, this concept explores "messy, plural, mutualistic cultures" of interdisciplinary *relationships* (UNESCO, 2022, p. 46). The main argument for so choosing is that, between knowledge-centered *integration* and people-centered *socialization*, the latter provides a better lens for observing interdisciplinarity and interculturality which often happen at the same time! This education-oriented concept also draws upon Stirling (2007)'s diversity framework of science in reflecting variety, balance, and disparity issues of interdisciplinarity through the lens of socialization instead of

bibliometrics which is commonly adopted by research-oriented inquiries of interdisciplinarity (Wagner et al., 2011).

Interdisciplinary mobility can be leveraged to navigate strong gravitational forces that are pro-STEM in contemporary higher education and, in the country of China, pro-exam culturally. According to the Humanities Indicators (2021), all academic fields except engineering, health, and natural sciences experienced loss in the share of bachelor's degrees conferred in the U.S. between 2008 and 2018, with education and the humanities losing up to 30 percent. In 2018, the share of bachelor's degrees awarded in the humanities was only about a third of the size for the sciences. Over in China, higher education is traditionally pro-STEM since 1949, but what's more distinctive is a pro-exam academic culture dating back *to the Imperial Examination System* (科 举制度) which had been around in Imperial China for 1300 years. These create both inertia and impetus for change in terms of interdisciplinarity. On one hand, many Chinese comprehensive universities were originally specialized universities serving national needs such as teacher education and science and technology development. Innovations such as the *shuyuan*(书院) residential model (Li & Sun, 2015; Zhao et al., 2018) are just on the way, with limited evidence of impact on interdisciplinarity. On the other hand, the influx of Sino-foreign joint venture institutions over the last two decades introduces interdisciplinary ideas and practice from the West as well as uncertainties for their long-term sustainability in the Chinese context (Cao, 2021). These nascent and intertwined developments promise a rich soil for new conceptualizations of interdisciplinarity (e.g., *interdisciplinary mobility*) as a pivotal strategy for navigating strong gravitational forces in contemporary Chinese higher education. The pro-STEM and pro-exam gravitational forces are not necessarily bad, but they require counterbalancing if non-STEM fields are crowded out from educational experience or if purposefulness is stymied in learning other than for exam preparation. This interdisciplinary mobility, which drives *purposeful socialization of problem-solving*, is a promising lens with which it is possible to counterbalance these two gravitational forces in China

and thereby shape a distinctively Chinese brand of liberal arts and sciences education.

The Research Question and Methodology

Let's use this interdisciplinary mobility concept to answer a research question regarding Duke Kunshan University (DKU). The research question is: What can be done to scale interdisciplinarity so that it is characteristic of a higher mobility? DKU is selected for this inquiry because it is uniquely purposed and structured for experimenting on interdisciplinary undergraduate education in China (Godwin & Pickus, 2017).

DKU is a Sino-American joint venture liberal arts and sciences university in Kunshan, China. Co-founded by Duke University and Wuhan University in 2013, DKU began its distinctively interdisciplinary undergraduate program in 2018 with a vision to shape a Chinese brand of liberal arts and sciences education. Supporting this interdisciplinary vision are an array of innovative structural and curricular features of which the most prominent are, for the purpose of this inquiry, department-free academic divisions (i.e., Arts and Humanities, Natural and Applied Sciences, and Social Sciences), interdisciplinary and interdivisional majors, high-intensity 7-week block schedule together with no-class Fridays, and capstone Signature Work project beginning at the second half of the sophomore year. These features contribute to the fulfillment of seven institutional learning outcomes (or Animating Principles)[3] which include, among others, *A Purposeful Life* and *Collaborative Problem-Solving* to correspond with the highly employable skills of *taking initiative* and *teamwork*.

As it is, however, a few academic leaders perceived a need to scale interdisciplinarity at DKU, using words such as *intentionality* to call for strengthening in the aspects of involvement, rigor, and guidance. By defining interdisciplinarity as *purposeful socialization of problem-solving*, it interprets this need as one to propel a higher mobility so that students and faculty more purposefully engage in more frequent and/or more diverse socialization for the

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[3] The seven Animating Principles are Rooted Globalism, Collaborative Problem-Solving, Research and Practice, Lucid Communication, Independence and Creativity, Wise Leadership, and A Purposeful Life.

sake of academic problem-solving. But what can be done? What is the linchpin among the existing structural and curricular features that holds together the three ingredients of purposefulness, socialization, and academic problem-solving? To use an analogy, where is this force with which DKU can push down this set of dominoes which is interdisciplinarity?

This study proposes a theory of change for scaled interdisciplinarity which claims that interdivisional Signature Work co-mentorship is this linchpin. The term *theory of change* was popularized by Weiss (1995), with its methodology rooted in program evaluation and social change. This study adopts a definition for theory of change by the Center for Theory of Change (2023) as "a comprehensive description and illustration of how and why a desired change is expected to happen in a particular context". It then follows Reinholz and Andrews (2020, p. 3)'s "anatomy" of theory of change by identifying the four components of the proposed theory of change: 1. context (i.e., DKU's interdisciplinary undergraduate program), 2. long-term outcome/precondition (i.e., scaled interdisciplinarity/interdivisional Signature Work co-mentorship), 3. intervention (i.e., an incentive mechanism called "FiFund"), and 4. assumption (i.e., Interdisciplinarity can be scaled.). A participatory approach was employed by engaging reflective conversations with students, faculty, and key administrators of DKU's undergraduate program. The strength of employing a theory of change approach is that it goes beyond the *does it work?* question by asking *under what conditions and for whom?* (Pawson & Tilley, 1997). In this sense, this approach is appropriate for exploring under what conditions and for whom does interdisciplinarity work at DKU.

Data in the forms of a Qualtrics survey and online interviews were collected for statistical and thematic analyses in the summer of 2021 from the inaugural undergraduate class of DKU (N = 244) as well as all faculty from the three academic divisions of undergraduate education (N = 93). Respectively, 54 percent of the students and 82 percent of the faculty participated in the survey. About 60 hours of interviews were recorded. The survey data underwent descriptive statistical analyses using SPSS while the interview data were coded by themes and analyzed using NVivo. This case study is significant for and beyond DKU because it is the first to empirically examine this young university

which is arguably the foremost proponent of interdisciplinary higher education of all Sino-foreign joint venture institutions rising in China over the last two decades. Therefore, it has both theoretical and practical values for like-minded institutions.

Findings and Discussion

A theory of change is proposed through a theme-based narrative below which draws extensively upon the research findings. At its core, this narrative discusses key barriers to interdisciplinary mobility at DKU as well as an opportunity to overcome these barriers by adopting interdivisional co-mentorship for the university's capstone Signature Work component of its undergraduate curriculum. The Signature Work is ideally a universal waypoint for observing student purposefulness (i.e., whether or not to do an interdisciplinary/interdivisional project), socialization (i.e., whether or not to do a team-based project such as a co-mentored project), and academic problem-solving (self-explanatory). A key barrier is that there is no intentional mechanism for observing and leveraging interdisciplinary mobility at DKU. This narrative also discusses other institutional challenges that may be ameliorated by this proposed change. One caveat for this theory of change is that it does not intend to suggest a binary nature of interdisciplinary mobility where it is to be switched on or off. More accurately, it is a scale for directing further intention and resources towards existing low-profile but high-impact practices. In this sense, this theory of change leans towards a moderate instead of radical approach of intervention.

Interdisciplinary Mobility: Being Department-Free is Not the End of Silos.

A major can also be a silo.

> "I used to see Data Science as just another major, but then I realized it is a very deep field and I need to learn so many different things. I also need to pick a direction, but there is not much guidance about it. So, it is a huge major, and people are scattered all over it."

> –A student interviewee

A track within a major can also be a silo.

> "I do not feel a lot of interdisciplinary connections even within the same branch of one big major like molecular bioscience. There is not a lot going on between students who study biophysics with those who study cell biology or genetics or biogeochemistry. Once we pass the sophomore year and become juniors, we all just go apart."

> –A student interviewee

Excessive silos are a nemesis to interdisciplinarity. One strategy DKU adopted to eliminate silos is running department-free academic divisions. Students freely explore their passion and interests without having to worry about structural hurdles, that is, if such hurdles only exist as far as academic departments are concerned. In fact, department is not at the end of the long train of academic silos. Major, for one, may very well become a "department" at DKU, said one interviewee, especially when there are disproportionately popular majors at DKU such as data science. If increasingly real-world problems are not within-discipline problems (Ledford, 2015), even an academic division for that matter is prohibitive if solution to a problem lies beyond the divisional boundary (e.g., global pandemic and climate change). Non-structural forces may also contribute to silos, such as divergent influences from partner institutions (i.e., Chinese vs. American) as well as tensions due to inherent disciplinary affinity and lack thereof for interdisciplinarity. To counter this

clawing back of excessive silos, instead of further structural flatness, the solution is to energize interdisciplinary mobility across existing structures. In other words, use silos such as academic divisions to scale and measure interdisciplinarity.

Higher Interdisciplinary Mobility: Interdivisionality has a Cascading Effect upon Interdisciplinarity.

Students may have wide interdisciplinary/interdivisional pursuits which require higher interdisciplinary mobility.

> "My Signature Work project is about warfare and environmental history. My mentor is a history professor who is very helpful. But I feel like I also need help from professors who know about environmental science and specifically military history."

> –A student interviewee

There is a distinction between narrow/unidivisional and wide/interdivisional majors in terms of interdisciplinary mobility.

> "If you look at the requirements of the Data Science major, while it has technically different disciplines, they are very close. There is nothing from any other division, for instance, and it is only Natural and Applied Sciences. Some majors, like Global Health, have requirements from another division such as Social Sciences, which I think is much more interdisciplinary."

> –A faculty interviewee

What is a cascading effect? To quote Confucius who taught in *lunyun* (论语) that "取乎其上，得乎其中；取乎其中，得乎其下；取乎其下，则无所得矣"，a cascading effect allows one to hit high if he or she aims higher. There is no denying that interdisciplinarity is being undertaken at DKU and that incentive structures exist on a divisional basis. And yet, the author was still asked by some academic leaders about triggering interdisciplinarity. This implies two

messages. First, interdisciplinarity is esoteric. One does not have to invoke Michel Foucault's *The Order of Things* (2001) to understand that natural classifying and adopting of knowledge well predate the coining of the terms *disciplinarity* and *interdisciplinarity* which unfortunately do not always facilitate. More practically, unless a person teams up with someone of a different disciplinary background and get their feet wet together on some collaborative research or co-teaching, interdisciplinarity remains a buzzword from a thirty-thousand-foot view. Second, a thirty-thousand-foot view is nevertheless useful for scaling interdisciplinarity if one replaces the esoteric with a view of interdisciplinarity that centers upon mobility. Take Computational & Design which is a major built across three academic divisions, anyone can understand that it is at a higher level of interdisciplinarity than a unidivisional major such as material science without having to understand how this major is actually integrated. Including Computational & Design, DKU has 7 interdivisional majors compared with 8 unidivisional majors, which together forms a cascading landscape of interdisciplinarity.

By understanding the three academic divisions as silos, one is able to see movements characterized by faculty collaborative research, co-teaching, Signature Work co-mentorship, and on the part of students, declaration of interdivisional majors as well as interdivisional Signature Work projects (Ye, 2022). If the ancient Chinese wisdom still rings true, one needs to leave the esoteric to disciplinary experts and scale up interdisciplinarity by aiming higher at interdivisionality. If interdisciplinarity is indeed flourishing at DKU, one should be able to observe boosted interdivisional mobility. Vice versa, if initiatives and resources are in place to trigger and sustain interdivisional mobility, then one can be confident that the interdisciplinary vision of DKU is on course.

Higher Interdisciplinary Mobility Support Features: 7-Week Block Schedules and No-Class Fridays Cultivate Mindsets and Habits Necessary for Interdisciplinarity.

There is room for further communicating the collective purpose of innovative curricular features in light of interdisciplinarity.

> "I cannot clearly see how the 7-week block schedule contributes to interdisciplinarity or any of the seven Animating Principles at DKU."

> –A faculty interviewee

DKU's undergraduate program has a list of curricular features that are distinctive and yet inarticulate as to their collective purpose. These features range from being "liked" to "disliked" and "confusing" according to the interviewed students and faculty. Some argued that they were not particularly designed for the purpose of interdisciplinarity. Others said that certain features, as they are, feel even antithetical to certain Animating Principles. What is this collective purpose?

One thing for certain is that two features stand out as being not particularly in tune with the rest which are arguably in support of interdisciplinarity one way or another. The first is the 7-week block schedule. DKU's undergraduate curriculum splits a conventional 14-week semester into two 7-week block schedules to encourage the nimble teaching and learning of more (interdisciplinary) content. Unlike the three consecutive and themed common core courses [4] that are widely liked for their apparent and refreshing characterization of interdisciplinarity, the 7-week is a mixed bag with a unanimous voice: Why not 14? Regardless of the debate on numbers, this inarticulation of purpose may create a vicious cycle with post-COVID Fridays [5], in which diminished field trips and social activities on Fridays rationalize a dedication to, if nothing else, a scrambling catch-up mode due in no small part to the academically demanding 7-week.

These two features, as they are, may threaten to muddy the waters in terms of an articulate purpose of the collective features. One case to make for these two features, if they are to remain unchanged and to the effect that they are in tune with other features to support interdisciplinarity one way or another, is that they

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[4] The three themes are *China in the World* (Year 1), *Global Challenges in Science, Technology, and Health* (Year 2), and *Ethics, Citizenship, and the Examined Life* (Year 3).

[5] No-class Fridays encourage experiential learning in ways such as field trips to locales in the neighbouring cities of Suzhou and Shanghai.

serve to cultivate mindsets and habits necessary for interdisciplinarity. These mindsets and habits range from purposefulness to resilience (AAC&U, 2021, p. 8) which do not have a natural home in a curriculum and yet are twice as needed to flourish in an interdisciplinary setting as well as a packed 7-week or on a laissez-faire Friday. Given that these mindsets and habits are also transferrable between college and workplace, it is useful to mix the Friday offerings with a career design component (iCLA, 2022) to focus on these mindsets and habits. For example, since both 7-week and Fridays are about time, workshops on time-management and how it relates to these mindsets and habits could be helpful. This solution is likely to nurture a coherent view and function of the curricular features underpinned by interdisciplinarity as well as to counterbalance uninformed bandwagoning of popular career choices.

Higher Interdisciplinary Mobility Missing Link: It is Time to Focus on a Bottom-Up Approach.

DKU's deliberate curricular features are a testament to its intent to bring about rigorous interdisciplinarity, but there is a caveat here which is two-fold. On one hand, the intent must continue to counterbalance an inevitable gravitational pull of disciplinary specialization (Frodeman & Mitcham, 2007, p. 511) dictated by predominant workforce trends still favoring science and technology. If these trends will for a long time focus on the human-machine interface and continue to appreciate the human sphere of this equilibrium (Adams, 2022; Yu, 2023), which is almost certain, then the counterbalancing strategy should be one of wider interdisciplinarity (e.g., humanity and machine learning) or precisely interdivisionality at DKU to reflect this biggest workforce value-add. On the other hand, the intent must refrain from an excessively top-down approach for the simple reason that interdisciplinarity is not everyone's cup of tea due to disciplinary and personal peculiarities. Instead, ask this question: Who is more well-versed in a specific interdisciplinary research, teaching, or learning activity than the person presently at it? The obvious answer validates a bottom-up approach which, instead of struggling to indoctrinate interdisciplinarity, identifies and supports a variety of existing interdisciplinary activities at DKU that are very prone to scaling through faculty collaborative research, co-teaching, team Signature Work projects, and Signature Work co-mentorship.

Two linchpins are vital to this bottom-up approach. The first is interdivisionality, which sets a clear bar to identify existing interdivisional activities as well as to attract whoever else would like to challenge at this level of interdisciplinarity. The second linchpin is an incentive mechanism to boost interdivisional mobility by using existing scaling channels such as Signature Work co-mentorship. Over time, and this is key to this bottom-up approach being progressive, lessons learned can be gathered from deliberate interdivisional practitioners to inform wide as well as narrower unidivisional interdisciplinary practice. The next section will explain why this incentive mechanism should target interdivisional Signature Work co-mentorship.

The Second Linchpin: An Incentive Mechanism

Co-mentorship naturally enhances interdisciplinary mobility and is unofficially happening.

> "I am kind of like a secondary mentor for two Signature Work projects. I think co-mentorship is a great idea. There are a lot of projects out there that are interdisciplinary in a way that no faculty member is expert in all areas of a given topic. So, there is a lot of benefit in having this team-based approach."
>
> –A faculty interviewee

Co-mentorship is not incentivized currently.

> "I think Signature Work co-mentorship would be a wonderful idea if faculty members were given proper credit for the work they do. Currently we do not have such a framework or give credit to the secondary mentor."
>
> –A faculty interviewee

Taking initiative is a valued quality of mentees.

> "I have a student who likes to take the initiative. I remember I suggested a Signature Work topic to her, and she came up with

something that makes it a lot better for her. She is always proactive in trying to find what would fit her best. That is actually a very good experience and is what I expect from a student."

–A faculty interviewee

This theory of change adopts the mobility lens of interdisciplinarity and proposes an incentive mechanism to drive higher mobility at the interdivisional level. Phase 1 results[6] show four important findings using an observational framework of interdivisionality: First, students choosing an interdivisional major have a significantly higher self-perception on Rooted Globalism than those choosing a unidivisional major; Second, students choosing a Signature Work topic wider or narrower divisionally than major have a significantly lower self-perception on Research and Practice; Third, student self-perceptions on Wise Leadership and A Purposeful Life are generally lower than on other Animating Principles; Fourth, students choosing an interdivisional major as well as an interdivisional Signature Work topic generally show a higher self-perception on each of the seven Animating Principles.

These findings preliminarily established merit and utility for driving higher interdivisional mobility. But what exactly is this incentive mechanism? Phase 2 results show strong thematic findings about Signature Work co-mentorship. Already, 16 percent of the Class of 2022 ($N = 128$) have at least one co-mentor, and 27 percent of all Signature Work mentors ($N = 55$) are co-mentors. Interdivisional collaboration is one rationale behind co-mentorship, with 35 percent of the co-mentored projects being interdivisional and 60 percent of the co-mentors supervising together with a colleague from another academic division.

By defining interdisciplinarity as purposeful socialization of problem-solving, these numbers are unsurprising because co-mentorship naturally fosters

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[6] Phase 1 represents an earlier unpublished study conducted by the author at DKU. The Phase 1 study is stand-alone and builds toward the current Phase 2 study on a theory of change. The Phase 1 study proposes a framework for observing interdisciplinary student learning in the context of DKU's interdisciplinary undergraduate program, drawing upon the distinctive structural feature of three interconnected department-free academic divisions.

socialization and carries a spirit of interdisciplinarity. The problem is, there is no mechanism to leverage these numbers for driving and supporting higher interdivisional mobility, especially when 30 percent of the Class of 2022 chose, ambitiously, an interdivisional Signature Work topic. In other words, this bottom-up approach is presently missing the *up* part!

An incentive mechanism revolving around interdivisional Signature Work co-mentorship will not only address this issue but also synergize with the strengthening of other Signature Work aspects. First, funding need. 40 percent of the Class of 2022 ($N = 119$) requires funding for their projects, with 52 percent of them not knowing where to secure funding and 56 percent expressing difficulties in doing so. Second, early socialization. Students tend to do well in Signature Work by starting early through robust socialization with faculty and fellow students. Third, a sense of agreement. Not all mentoring relationships have a clear division of labor up front, often resulting in one side expecting more ownership and leadership from the other. Fourth, interdivisional research capacity. Students may experience greater interdisciplinary challenges when their projects are interdivisional, which is evidenced by a significantly lower self-perception on Research and Practice for those choosing a topic wider or narrower divisionally than major. Before going into detailed description of this incentive mechanism, two things below are worth discussing about interdivisional Signature Work co-mentorship.

Two Birds with One Stone: Using Interdivisional Signature Work Co-Mentorship to Scale Interdisciplinarity and Shore up Capacity Gaps

Single mentorship is not always effective for guiding interdisciplinary work.

> "Some professors have limited experience with interdisciplinary research. So, it is hard for a single mentor or professor to guide you through an interdisciplinary project."
>
> –A student interviewee

Mentee per mentor ratios are uneven across the three academic divisions.

"Signature Work mentorship is quite unbalanced. I am a sociology professor, and nobody came to me. It is not that I do not want to supervise or mentor students. They just do not seem to be interested in sociology as much. They want to do something more relevant to career or graduate school."

–A faculty interviewee

Signature Work co-mentorship naturally brings in richer faculty perspectives to facilitate interdisciplinarity. The data show that co-mentorship is already happening at DKU, with 27 percent of the Signature Work mentors (N = 55) being a co-mentor. These co-mentors (N = 15) show a high propensity for interdivisional and intercultural collaboration, with 60 percent supervising together with a colleague from another academic division and 87 percent with a colleague of a different nationality. On the other hand, while 44 percent of the Signature Work mentors (N = 55) supervise a project that is interdivisional with their expertise, suggesting of interdisciplinarity, at least 27 percent do it alone. This points to a capacity issue: How well can a Signature Work mentor supervise interdivisionally alone? In fact, 30 percent of the Class of 2022 (N = 130) chose an interdivisional Signature Work topic, with two-thirds being supervised by one mentor. Is this arrangment ideal?

The capacity issue can be further characterized by an uneven distribution of Signature Work mentors from the lens of academic divisions. By the time of data collection, 27 percent of the eligible faculty members from the three academic divisions (N = 76) were not Signature Work mentors, with 50 percent from Arts and Humanities, 30 percent from Social Sciences, and 20 percent from Natural and Applied Sciences. Signature Work mentors (N = 55) supervise an average of 2.8 projects, with 3.1 for Natural and Applied Sciences, 2.6 for Social Sciences, and 2.5 for Arts and Humanities. About one-third of the Signature Work mentors (N = 55) supervise 4 or more projects rather than the maximum 3 recommended by the Office of Signature Work, with 55 percent from Natural and Applied Sciences, 28 percent from Arts and Humanities, and 17 percent from Social Sciences. The implication is clear: The gravitational pull towards Natural and Applied Sciences may very well be at the expense of the

other two academic divisions without a counterbalance mechanism which creates a level playing field for all academic divisions and is therefore inclusive of more faculty members.

Interdivisional Signature Work co-mentorship is such a mechanism which draws in faculty members who are not mentoring but would like to, allows mentoring an interdivisional Signature Work project together instead of alone, and counterbalances the gravitational pull towards Natural and Applied Sciences. Above all, it is interdisciplinary in nature and is already happening.

Not just Expertise: A Multidimensional Understanding of Interdisciplinarity and Signature Work Co-Mentorship

The rationale for co-mentorship can be about more than just the accumulation of academic expertise.

> "My approach to Signature Work mentorship is like project management: Let me help you get this project done and do it well, and let's make sure this project helps you in your future career so that you do not do something that will be a total waste of time for you and for others. It is very hard for me to see how interdisciplinarity even plays out in my mentorship."
>
> –A faculty interviewee

Student pursuits may require academic expertise not readily available from any mentor.

> "The biggest challenge for me is there is no education professor to mentor my Signature Work project. We have math professors, we have sociology professors, we have public policy professors, but none of them know specifically about educational research related to human development or higher education. In the end, I invited an anthropology professor."
>
> –A student interviewee

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Just as interdisciplinarity can be studied from both esoteric and mobility lenses, co-mentorship can also be understood as a multidimensional practice. One may question its feasibility by worrying about the available expertise from the current pool of faculty members at DKU. There are three angles to address this concern. First, co-mentorship is already happening, which is ideal for a bottom-up approach that seeks to incentivize rather than mandate. Second, expertise is multidimensional between content and methods, which provides layered rationale for co-mentorship. Third, co-mentorship is not solely about cumulation of expertise. Think about a dissertation committee in which members also bring in professional experience and personalities to form an effective multidimensional team. DKU has this faculty (not expertise) surplus to allow a foretaste for students who would go on to pursue graduate or even doctoral education.

There are also situations where mentor expertise becomes a smaller factor. For example, some student interviewees chose to study education for graduate school, knowing that DKU does not have a School of Education or abundant resources for this academic field. Nonetheless, some have received offers from world elite graduate schools and revealed that they value career advising more than expertise in Signature Work mentorship. Their successes and the fact that education is not the only academic field beyond any DKU major are testaments to a need for mentoring or co-mentoring these students multidimensionally. For academic fields where expertise is more readily available at DKU, such as data science which is prime for interdivisionality due to its inherent connection with domain knowledge, multidimensional co-mentorship would also add socio-emotional value which is perhaps more luxurious to students from Natural and Applied Sciences.

FiFund: A Theory of Change for Scaled Interdisciplinarity at DKU

Taking initiative primarily on the part of students is key to [team-based] success in Signature Work.

> "The Signature Work mentorship, well, not just the mentorship, but the Signature Work process generally is challenging because it extends over a very long period of time. It is not just something

that the students do at the very end of their training. It is something that involves preparation, planning, procedures, paperwork, and so forth."

–A faculty interviewee

"Getting a head start on Signature Work is very important. I feel like I was one of the lucky students who started with my Signature Work teammate really early and also found my mentors really early and kind of stay motivated throughout this experience."

–A student interviewee

FiFund is the proposed incentive mechanism for this theory of change. "FiFund" is a word coined by putting "Fi" and "Fund" together where "Fi" is a reversed "If" to all kinds of possibilities at the interdivisional level.

FiFund incentivizes two things: interdivisional mobility and early initiation of Signature Work projects. There are four principles to guide configuration of FiFund: First, FiFund is a recurring competitive award open to student applicants. Second, FiFund has three core eligibility requirements, including interdivisional nature of the proposal, one interdivisional faculty co-mentor at minimum, and alignment with the present or future Signature Work project. Third, FiFund encourages teamwork with fellow students, though not required. Fourth, FiFund has a mix of fixed amount and full coverage awards to attract both need and merit.

Measurable impact of FiFund include higher mobility at the interdivisional level according to the observational framework of interdivisionality (Ye, 2022), earlier initiation of Signature Work projects, cascading effects upon non-awardees, lower faculty non-participation in Signature Work mentorship, facilitated sampling for continuous correlational studies of interdisciplinarity and learning outcomes, and overall scaled interdisciplinarity at DKU. The goal of making FiFund student-eligible only is to foster a sense of ownership and leadership with which students often struggle in the Signature Work process. Nevertheless, faculty not only play a key role in facilitating students' interdivisional inquiries, but also benefit from interdivisional co-mentorship in terms of faculty

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socialization which may lead to flourishing of interdivisional teaching and research collaboration. The data suggest room for strengthening faculty collaboration, with 49 percent of the faculty members from the three academic divisions (N = 76) having experience in co-teaching at DKU, 20 percent in Signature Work co-mentorship, and only 8 percent in both. In this sense, FiFund is a linchpin of student and faculty interdivisionality which together serve DKU's vision of interdisciplinarity. A distinctive utility of FiFund is that it teases out deliberate interdivisional endeavors to become samples for continuous correlational studies of interdisciplinarity and learning outcomes, which is not nearly as feasible with an esoteric definition of interdisciplinarity. Depending on the availability of funds, FiFund can either be a dedicated fund or be incorporated into existing funding programs that seek to promote interdisciplinarity more generally.

Additional Thoughts, Limitations, and Future Directions

Traditional debates tend to focus on the *knowledge* dimension of interdisciplinarity by arguing within a framework which also includes multidisciplinarity and transdisciplinarity. While descriptively sound, this framework does not sufficiently prescribe a way forward for interdisciplinarity in a 4IR age where knowledge integration is not only a merit but also increasingly an imperative. Nor does it reflect *intentionality* (Stokols et al., 2003) as an important people and organizational factor which drives truly meaningful interdisciplinary collaboration. A *relationship* dimension, on the other hand, asks *why* on top of *how* about interdisciplinarity at both personal and organizational levels by acknowledging synergistic outcomes (e.g., interculturality) as well as corresponding gap issues related to institutional policy and resource allocation. Structural innovation such as DKU's department-free academic divisions should go on asking why it matters to generation of interdisciplinary knowledge *as well as* cultivation of student and faculty relationships in an interdisciplinary environment. This is one step towards a common language for stakeholder groups of LAS education (AAC&U, 2021; Adams, 2022) and is the main theoretical value of this study.

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There are two caveats to applying the concept of interdisciplinary mobility. Firstly, in the context of DKU, this concept does not support the idea that *interdivisional* mobility necessarily yields higher order cognitive or relational outcomes compared with *unidivisional* mobility. Instead, the concept enables verification of this idea as a future direction of institutional research for DKU as well as universities which adopt similar structural innovations. These institutional efforts will contribute empirical evidence to the debate on the presumptiveness of higher order impacts as a result of interdisciplinarity (Alexander et al., 2013; Klein, 2008; Laursen et al., 2022; Vogel et al., 2013). Secondly, this concept does not ignore the possibility of *a fully interdisciplinary person* (Wagner et al., 2011) who may defy observation of such mobility, nor the greater barriers of certain disciplines for going interdisciplinary (Stirling, 2007). Instead, the concept helps to identify interesting outliers as a result of nuanced intentionality for interdisciplinarity which is another interesting topic for future research.

In light of the caveats, this study has two limitations. Firstly, it is a single case study which provides limited comparative insights. This is due to the study being an institutional research in nature as well as the fact that DKU's intentional structural innovation (i.e., department-free academic divisions) facilitates an observation of interdisciplinary mobility not to be easily replicated elsewhere. It is recommended that future comparative studies develop a deepened and more nuanced concept of interdisciplinary mobility. Secondly, while this study strives towards the formation of a common language for stakeholder groups of LAS education, including primarily LAS institutions and employers, it only *just* begins to do so. More efforts on a comprehensive vocabulary of employer expectations of college graduates are needed to demonstrate how a higher level of interdisciplinary mobility can achieve differently. AAC&U's 16 VALUE rubrics[7] are a useful resource in the sense that they walk the talk on LAS education by conducting rigorous assessment on essential learning outcomes[8] such as critical thinking, written communication, and quantitative literacy (AAC&U,

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[7] The 16 VALUE rubrics are publicly available at https://www.aacu.org/initiatives/value-initiative/value-rubrics.

[8] The Essential Learning Outcomes framework is publicly available at https://www.aacu.org/trending-topics/essential-learning-outcomes.

2017). Notably, these outcomes all belong to the "Intellectual and Practical Skills" cluster according to AAC&U's framing, and very little was done about other clusters, including particularly the "Integrative and Applied Learning" and "Personal and Social Responsibility" clusters which cover interdisciplinary and intercultural competencies respectively. This is a promising direction to explore further.

Conclusion

Despite being a key feature of the Fourth Industrial Revolution and a core strength of liberal arts and sciences education, interdisciplinarity is also a noisy buzzword that does not always make sense from an operational point of view. Traditional interdisciplinary fields take it for granted, like fish in the water, while, somewhere else, people keep a distance and have questions. *Doing* interdisciplinarity faces additional boundary challenges due to strong gravitational forces that are national, historical, and increasingly from both college and workplace. For institutions like DKU, whose vision for robust interdisciplinarity is rooted across these boundaries, it is not enough to set up a curriculum, hoping that once and for all the train of interdisciplinarity will roar on. In reality, it may take a higher magnitude of interdisciplinarity and constant enabling mechanisms to balance out certain gravitational forces, such as the pro-STEM and pro-exam tendencies in Chinese higher education. To use an analogy, interdisciplinarity requires *setting off* after setting up the dominoes, and this is where DKU currently finds itself. The proposed theory of change for scaled interdisciplinarity does not seek to answer all questions relevant to this DKU inquiry. Instead, it sets the tone for continuous discourse on how interdisciplinarity may go further based on the curriculum, in a way that is not decoupled from learning outcome discourses.

For like-minded institutions and researchers of interdisciplinarity, this inquiry recommends a roadmap with four signs. First, a definition of interdisciplinarity rooted in institutional values (e.g., the Animating Principles of DKU) and with a vocabulary common to college and workplace. Second, a mobility lens for measuring and leveraging different and especially higher magnitudes of interdisciplinarity (e.g., interdivisionality at DKU). Third, a linchpin mechanism

for energizing this mobility so that interdisciplinarity is more entwined with other institutional facets of teaching, learning, and research (e.g., FiFund). Finally, an awareness of the potential of interdisciplinarity for counterbalancing various gravitational forces of higher education at local and historical levels.

References

Adams, W. (2022). *Getting ready: The liberal arts and sciences in the post-pandemic world*. Washington, DC: American Association of Colleges and Universities.

Alexander, J., Bache, K., Chase, J., Freyman, C., Roessner, J. D., & Smyth, P. (2013). An exploratory study of interdisciplinarity and breakthrough ideas. Presented at the PICMET 2013: Technology Management for Emerging Technologies, pp. 2130–40.

American Association of Colleges and Universities. (2017). *On solid ground: VALUE report 2017*. Washington, DC: American Association of Colleges and Universities.

American Association of Colleges and Universities. (2021). *How college contributes to workforce success: Employer views on what matters most*. Washington, DC: American Association of Colleges and Universities.

Borrego, M., & Newswander, L. K. (2010). Definitions of interdisciplinary research: Toward graduate-level interdisciplinary learning outcomes, *The Review of Higher Education, 34*: 61–84.

Cao, C. (2021). Chinese joint-venture universities try for the best of both worlds. *Nature (London), 593*(7860), S28–S28. https://doi.org/10.1038/d41586-021-01406-z.

Center for Theory of Change. (2023). *What is theory of change?* Retrieved from https://www.theoryofchange.org/what-is-theory-of-change/.

Cheng, L. K., & Wei, X. (2021). Boya education in China: Lessons from liberal arts education in the U.S. and Hong Kong. *International Journal of Educational Development, 84*, 102419–.

https://doi.org/10.1016/j.ijedudev.2021.102419.

Foucault, M. (2001). *The order of things: An archaeology of the human sciences* (2nd ed.). Routledge.

Frodeman, R., & Mitcham, C. (2007). New directions in interdisciplinarity: Broad, deep, and critical. Bulletin of Science, *Technology & Society, 27*(6), 506–514.

Godwin, K. A., & Altbach, P. G. (2016). A historical and global perspective on liberal arts education: What was, what is, and what will be. *International Journal of Chinese Education, 5*, 5–22.

Godwin, K. A., & Pickus, N. (2017). Liberal arts & sciences innovation in China: Six recommendations to shape the future. *CIHE Perspectives,* no. 8.

Grosfoguel, R. (2013). The structure of knowledge in Westernized universities: Epistemic racism/sexism and the four genocides/epistemicides. *Human Architecture: Journal of the sociology of self-knowledge, XI*(1), 73–90.

Humanities Indicators. (2021). *Bachelor's degrees in the humanities: Findings and trends*. Cambridge, MA: American Academy of Arts & Sciences.

iCLA. (2022). *A liberal arts curriculum: Career design and internship*. Retrieved from https://www.icla.ygu.ac.jp/en/curriculum/.

Kirby, W. C., & van der Wende, M. C. (2016). *Experiences in liberal arts and science education from America, Europe, and Asia: A dialogue across continents.* Palgrave Macmillan US. https://doi.org/10.1057/978-1-349-94892-5.

Klein, J. T. (2008). Evaluation of interdisciplinary and transdisciplinary research: A literature review. *American Journal of Preventive Medicine, 35*(2 Suppl), S116–S123. https://doi.org/10.1016/j.amepre.2008.05.010.

Klein, J. T. (2021). *Beyond interdisciplinarity: Boundary work, communication and collaboration*. Oxford and New York: Oxford University Press.

Laursen, B. K., Motzer, N., & Anderson, K. J. (2022). Pathways for assessing interdisciplinarity: A systematic review. *Research Evaluation, 31*(3), 326–343. https://doi.org/10.1093/reseval/rvac013.

Ledford, H. (2015). How to solve the world's biggest problems*. Nature* 525, 308–311.

Li, H., & Sun, Xi. (2015). 我国高等学校实行书院制的优势、难点及对策. *中外企业家, 5.*

Lin, Z. (2003). Consequences and policy implications for university students who have chosen liberal or vocational education in Canada: Labor market outcomes and employability skills. *Higher Education Policy, 16*(1), 55–85. https://doi.org/10.1057/palgrave.hep.8300002.

Luckin, R. (2018). *Machine learning and human intelligence: The future of education for the 21st century*. UCL IOE Press.

Mansilla, V. B., & Duraising, E. D. (2007). Targeted assessment of students' interdisciplinary work: An empirically grounded framework proposed. *Journal of Higher Education, 78*(2), 215–237.

Ministry of Education of the People's Republic of China. (2021). *Guidelines for research and reform practice on New Liberal Arts projects*. Retrieved from

http://www.moe.gov.cn/srcsite/A08/moe_741/202103/t20210317_520232.html.

Nauffal, D., & Skulte-Ouaiss, J. (2018). Quality higher education drives employability in the Middle East. *Education & Training (London), 60*(9), 1057–1069. https://doi.org/10.1108/ET-05-2017-0072.

OECD. (2019). *OECD future of education and skills 2030 project background*. Retrieved from

https://www.oecd.org/education/2030-project/about/E2030%20Introduction_FINAL_rev.pdf.

Pawson, R., & Tilley, N. (1997). *Realistic evaluation*. London, UK: Sage.

Reinholz, & Andrews, T. C. (2020). Change theory and theory of change: What's the difference anyway? *International Journal of STEM Education, 7*(1), 1–12. https://doi.org/10.1186/s40594-020-0202-3.

Schwab, K. (2017). *The fourth industrial revolution*. Portfolio Penguin.

Stirling, A. (2007). A general framework for analyzing diversity in science, technology, and society. *Journal of the Royal Society, 4*, 707–719.

Stokols, D., Fuqua, J., Gress, J., Harvey, R., Phillips, K., Baezconde-Garbanati, L., et al. (2003). Evaluating transdisciplinary science. *Nicotine & Tobacco Research, 5*, S21–S39.

Telling, K. (2018). Selling the liberal arts degree in England: Unique students, generic skills and mass higher education. *Sociology (Oxford), 52*(6), 1290–306. https://doi.org/10.1177/0038038517750548.

UNESCO. (2022). *Knowledge-driven actions: Transforming higher education for global sustainability*. Retrieved from

https://unesdoc.unesco.org/ark:/48223/pf0000380519.

Vogel, A. L., Hall, K. L., Fiore, S. M., Klein, J. T., Bennett, L. M., Gadlin, H., Stokols, D., Nebeling, L. C., Wuchty, S., Patrick, K., Spotts, E. L., Pohl, C., Riley, W. T., & Falk-Krzesinski, H. J. (2013). The team science toolkit: Enhancing research collaboration through online knowledge sharing, *American Journal of Preventive Medicine, 45*: 787–9.

Wagner, C. S., Roessner, J. D., Bobb, K., Klein, J. T., Boyack, K. W., Keyton, J., Rafols, I., & Borner, K. (2011). Approaches to understanding and measuring interdisciplinary scientific research (IDR): A review of the literature, *Journal of Informetrics, 5*, 14–26.

Weiss, C. H. (1995). Nothing as practical as good theory: Exploring theory-based evaluation for comprehensive community initiatives for children and families. In J. Connell, A. Kubisch, L. Schorr & C. Weiss (Eds.), *New approaches to evaluating comprehensive community initiatives* (pp. 65-92). New York: The Aspen Roundtable Institute.

Yu, L. (2023). Responsible management education in the digital age: An experiment with executive education and undergraduate education at Duke Kunshan University. In C. Hauser & W. Amann (Eds.), *The future of responsible management education: University leadership and the digital transformation challenge* (pp. 79-98). Palgrave Macmillan.

Zanotti, L., & Palomino-Schalscha, M. (2016). Taking different ways of knowing seriously: Cross-cultural work as translations and multiplicity. *Sustainability Science, 11*(1), 139–152.

Zhao, W., Zhang, H., & Huang, L. (2018). 书院制教育管理模式探析. *教育教学论坛, 34.*