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ORIGINAL ARTICLE

Sino-German cooperation in vocational teacher training: A macro-micro-macro analysis of good intentions and unintended outcomes in China

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ABSTRACT

In this paper, we use the exemplary case of Sino-German cooperation to develop teacher training for technical and vocational education and training (TVET) in order to demonstrate both incongruent understandings of TVET systems in intercontinental cooperation and missing links between macrolevel objectives and micro level actions. To illustrate these problems, we use Coleman's boat model. Using this model, we conceptualize the objectives of an intercontinental cooperation project for TVET teacher training at the macrolevel and contrast these objectives with four different student types (enterprise-oriented students, TVET researcher-oriented students, TVET teacher-avoiding students, and TVET teacher-oriented students) who used their opportunities within this project to enhance their own educational endeavors. These endeavors were not necessarily in line with the objectives and eventually caused the termination of the undergraduate TVET teacher training program. As a result, only students of the fourth type decided to become TVET teachers, but mostly at the tertiary level in higher TVET colleges. Reasons for choosing a different career path include the attractiveness of other professional fields. For the TVET teacher training, we therefore recommend curricular modifications and raising students' awareness of the importance of TVET and its teachers in society.

Key words: international cooperation, technical and vocational education and training, teacher training, Germany, China, Tongji University, policy transfer

INTRODUCTION

In the last three decades, the transformation and upgrading of industries have raised new requirements for the quality of talent cultivation in technical and vocational education and training (TVET).[1] As a key factor in the cultivation of technical talents, continuously improving the quality of TVET teacher training is an essential approach to promoting further TVET development.[2] In response to this, the Chinese government has made efforts to issue policies and draw on international practical experiences. In 1993, the "Outline of China's Education Reform and Development" explicitly proposed "vigorously developing secondary TVET".[3] This has placed new demands on the quantity and quality of TVET teachers in mainland China. At the same time, policy transfer and international cooperation are used as means to improve TVET systems globally—with a particular focus on exporting German and Swiss and, less so, Austrian TVET models to other parts of the world.[4–7] On a national level, the German TVET system has been an

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important reference for Chinese TVET policymakers, practitioners, and researchers. In particular, collaborations between the Chinese and German governments regarding TVET were popular during the 80s and 90s due to the German "dual apprenticeship model", which is meant to be a global export champion.[6,8] Against this background, in November 1996, both governments signed an agreement to establish the "Sino-German Cooperation Project to Educate Vocational Teachers at Tongji University", which was officially launched in July 1997.[9] Built upon the famous German dual apprenticeship system, this program aimed to absorb and draw inspiration from Germany's wider TVET practices, particularly its TVET teacher training model. The program sought to adapt this model to cater to the needs of cultivating TVET teachers in China in a pilot study.

Tongji University was selected as a partner university for the program due to, on the one hand, its German roots and many ties to Germany and, on the other hand, more importantly for this study, its status of excellence within China. Tongji University, with its focus on engineering, belongs to a highly selective group of elite Chinese universities that have succeeded in both national excellence frameworks: projects 211 and 985.[10] The German side provided a total of an equivalent of €6 million (Institute of Vocational and Technical Education, Tongji University, 2024). By choosing Tongji University, highly qualified students were meant to participate and eventually become teachers in TVET schools, thereby improving the quality and quantity of TVET teachers in the Greater Shanghai area and supporting the development and advancement of TVET altogether. Furthermore, learning from Germany's TVET teacher training model, which includes university education as well as in-service training of teachers in a sequential manner, Tongji University was meant to become a national role model for TVET teacher training to foster imitation by other leading Chinese universities.

As for the pilot project, Tongji University had to provide institutional support. This included the establishment of an independent institute focused on TVET teacher training, the recruitment of qualified teachers and researchers, the provision of relevant conditions (*e.g.*, laboratories and other teaching equipment), and the development and implementation of theoretical and practical courses in pedagogy with the guidance of German experts and curricula for both a 4-year undergraduate program and a 2.5-year postgraduate program. To guarantee the smooth implementation of the program, the intention was for the German side to be responsible for the following measures: support in-service teachers to pursue doctorates in vocational pedagogy in Germany, provide German experts to support the curriculum development of the teacher training programs, and offer financial and technical support for the construction of teaching and learning laboratories at Tongji University.

The program, with the purpose of combining social needs and the university's advantageous engineering education resources, has successively developed four majors in the Institute of Vocational and Technical Education (in German: Chinesisch-Deutsches Institut fü r Berufsbildung) established at Tongji University: (1) Mechanical Engineering and Automation, (2) Electronic Information Engineering, (3) Civil Engineering, and (4) Business Administration. In the early stages (from 1997 to 2005), students enrolled in the program were from secondary TVET schools; however, students later mainly came from general high schools. A master's program was developed in 2001, with a focus on vocational pedagogy. With the termination of the bachelor's program in 2016, the TVET teacher training program has shifted its focus completely to the master's level.

With this case study, we provide an in-depth analysis of an intercontinental transfer project in TVET that was executed alongside several other projects to learn from German TVET. However, there has been a lack of academic investigation of the reasons for their successes or failures. Thus, in this paper, we explore a specific Sino-German TVET cooperation project to find reasons for its partial failure using a sociological model of the micro foundation of social action.[11]

In the following section, we present a brief theoretical framing, specifically Coleman's boat model[12] as well as its further development for use in education and TVET.[13] We then provide a brief overview of the methodology of this study (Section 3). In the following section, we present our results, highlighting four distinct student types (Section 4). Finally, we discuss our findings and provide a brief outlook (Section 5).

THEORETICAL FRAMING

It can be stated right away that the original goal of the program to boost TVET teacher training in Greater Shanghai through the education of TVET teachers at a prestigious university failed. To further analyze the reasons for this failure, we apply a model of macro-micro-macro relations developed by Coleman.[12] The model is particularly suited to reflect upon the necessary conditions at the micro level to achieve the goals on the macro levels. In essence, Coleman does not have an absolute definition of macro and micro but refers to two levels: the level where the goal must be achieved and the level below where the actual actions occur. Recently, the macro-micro-macro model, also referred to as the boat model due to its graphical representation, has been used (and adapted) for TVET.[14]

Using the boat model and applying the original idea outlined in the introduction produces the steps highlighted in Figure 1: (1) Through the establishment of a national pilot study program in TVET teacher training at Tongji University, a prestigious Chinese university with a focus on technical subjects. (2) More highly qualified and skilled students will apply for the otherwise neglected TVET teacher training. (3) The students will then pursue studies in a well-funded, well-equipped program with a highly innovative curriculum designed in close cooperation between Chinese and German TVET researchers. After graduation, the newly qualified students will start to work at TVET schools in Greater Shanghai. (4) Through the newly qualified TVET teachers, the TVET system in Greater Shanghai will increase in performance and reputation, making it a true alternative for students in China. While this might sound like a fairy tale, it simply outlines the implications of the program using the boat model, including the level where actions occur.

Schmees and Grunau further utilized the model for its application in education in general and TVET in particular by incorporating different actor types and their respective mindsets and behaviors.[13] The so-called tent model is based on the original boat model but provides a direct connection to a social science methodology aimed at conceptualizing actor types derived from interviews and other sources *via* qualitative content analysis. Much more than to reflect upon policies and programs, the model provides a framework for empirical analysis. In this way, it complements Coleman's boat's reflective approach (Figure 2).

Accordingly, we expect different student types to use the opportunities provided by the program to achieve their own goals. These goals are not necessarily aligned with the overall objective of the project and are therefore able to undermine those goals. At the same time, it is worth mentioning that although the estimated objectives were not achieved, this does not necessarily mean that the outcomes are not worth pursuing. Sometimes, the side effects of projects are still beneficial. In consequence, the analysis does not, by itself, provide an ethical perspective of whether the outcome is good or bad. Rather, it reflects whether the goals of what the project claims to achieve are accomplished. Finally, the theory of action at the micro level needs to be specified for our purpose. Here, we use rational decision-making from an individual's point of view as action theory.[15]

METHODOLOGY

In this paper, a case study design in combination with a qualitative research methodology was utilized to explore the research subjects' awareness and experiences of the TVET teacher training program at Tongji University. By integrating interviews, the researchers delved deeply into the subjective worlds of the research subjects to understand their feelings, thoughts, and experiences, thereby revealing the essence and significance of the phenomenon. The chosen methodology relates to Smith, Flowers, and Larkin's interpretative phenomenological analysis.[16,17]

The steps for the recruitment of specific research subjects are as follows: First, to obtain insight into the comprehensive construction progress of the TVET teacher training program, along with the aggregate learning performance of the students in the program, a lecturer who had been teaching at the Institute of Vocational and Technical Education, Tongji University, for over 20 years and possessed detailed knowledge of its history and evolution was selected for the interview. Second, following the interview with the lecturer ("pyramid scheme"), we not only gained knowledge concerning the development of the program and overall student demographics but also acquired a crucial piece of information: Most students opt for career paths such as working at corporations or pursuing further education upon graduation rather than becoming TVET teachers. Based on this lead, we selected four former students to participate in our interviews. The shared perceptions and expressions among these former students and the lecturer served as mutual corroboration (for instance, although dropouts as a student category could not be traced, their decisions were corroborated through information gathered from other students and the teacher), thereby further enhancing the credibility of the article's content. Finally, based on the information obtained, we classified the students into four types with the sequence of enrollment motivation, study behaviors, and career options. The purpose was to clarify the impact of the program's goals on micro-level entities, such as students and teachers, and how their behavioral choices affect the program's effectiveness.

Basic information about the student interviewees' education and career pathways was readily available, and when choosing the interviewees, we comprehensively considered their time of enrollment in the program as well as their education and career options. Therefore, the four students were clearly selected to represent different categories of students in the program, as the interview results will indicate. In total, one teacher and four students were interviewed (both face to face and online) in the first half of 2024. Their names were replaced with the initials of their respective roles (teacher/student) in uppercase for anonymity. The basic information of the interviewees is summarized in Table 1.

Specifically, the interviews delved into various aspects, including the reasons for the establishment of the TVET teacher training program, its curriculum design, students'

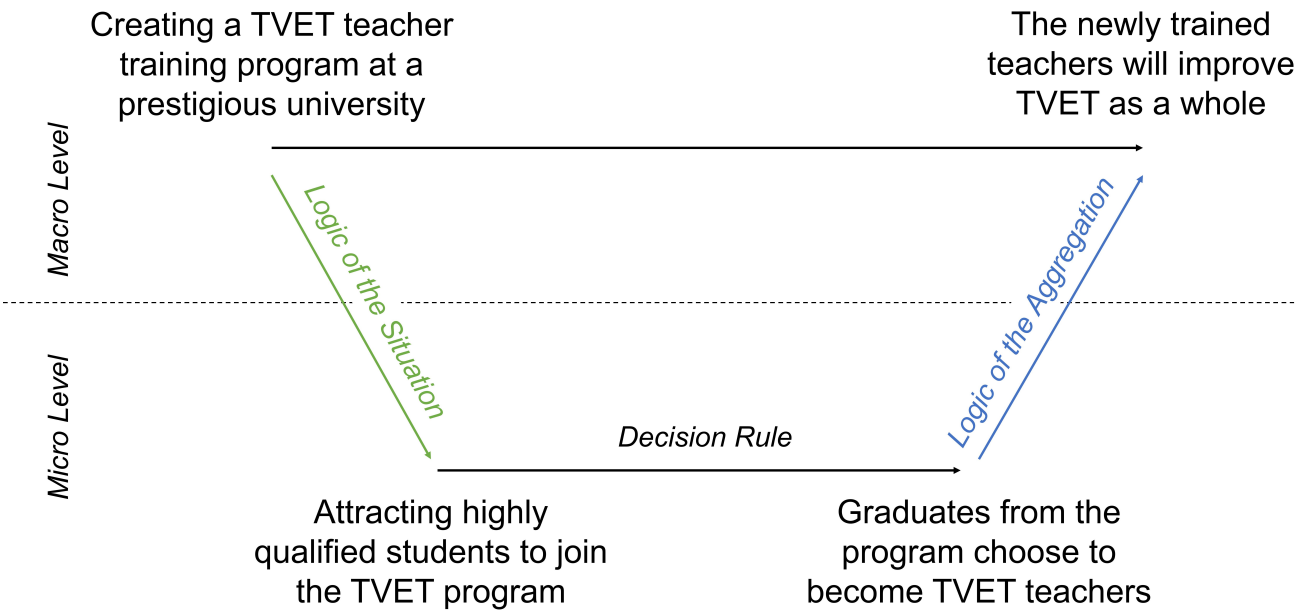

Figure 1. Macro- and micro-level relations in the case study. TVET, technical and vocational education and training. Source: Own creation, based on Coleman JS.[12]

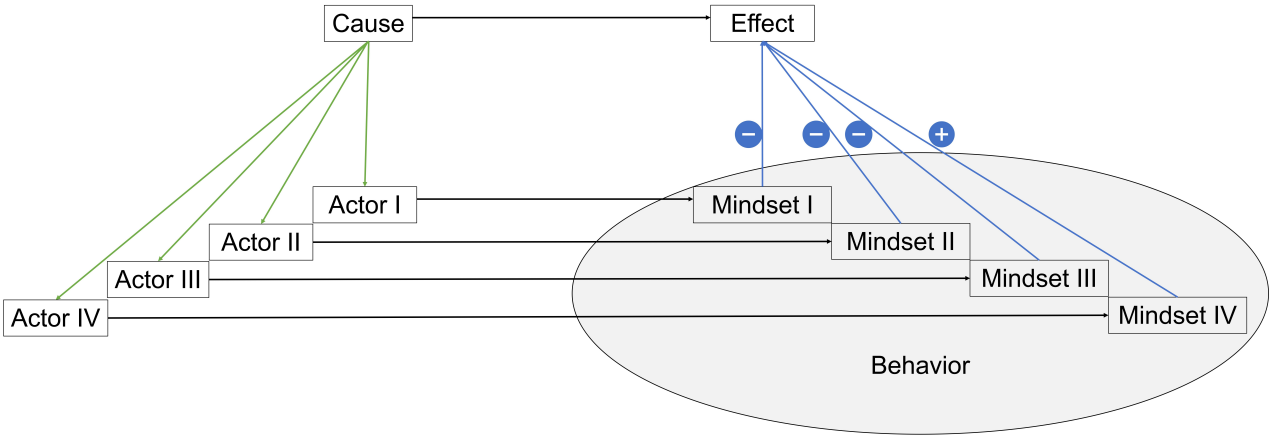

Figure 2. Macro-micro-macro "tent". Source: Own creation, based on Schmess and Grunau.[13]

Table 1: Basic information of interviewees

Abbreviation	Type	Format	Duration (min)
L1	Lecturer	Face to face	97
S1	Student	Online	40
S2	Student	Online	45
S3	Student	Online	50
S4	Student	Online	50

motivations for enrollment, academic performance, and postgraduation choices. The interviewer focused on the specific theme of the macro goals and implementation status of the program and devised differentiated interview outlines tailored to two distinct interviewee categories: lecturer and students. Guided by these outlines, the interviewer adjusted the content and sequence of the interview according to the actual situation and the interviewees' responses while maintaining a certain level of structural integrity and directionality. The specific content of the interview outlines is presented in Tables 2 and 3.

Under the premise of obtaining informed consent from the interviewees, the online interviews with four students were recorded with Tencent Meeting and transcribed into a text document within 48 h. The face-to-face interview with the lecturer was also written

Table 2: Interview outline for the lecturer

No.	Questions
1	Why did the Chinese and German governments support the establishment of a TVET teacher training program at Tongji University?
2	What was the training plan of this program like?
3	What were the reasons for the changes in the source of students?
4	How were students' learning motivations and behaviors?
5	What kind of influence did students' learning behavior had on teachers' teaching behavior?
6	Why did the undergraduate TVET teacher training program disappear?

TVET, technical and vocational education and training.

Table 3: Interview outline for the students

No.	Questions
1	Why did you choose to join the TVET teacher training program?
2	How did you feel about studying in this program after enrollment?
3	Have you ever switched your major? Why?
4	What were your learning plans and demands as a student?
5	Did you want to become a TVET teacher? Why?
6	Why did you choose to become a TVET teacher/researcher/employee?
7	Do you have any views and suggestions on the program?

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down, recorded and transcribed. To enhance the completeness, consistency, and accuracy of the interview content, supplementary information was gathered by further communications with interviewees through textual messages. Based on a thorough understanding of the interview information, insights into the project's objectives and its implementation were gained. By synthesizing the students' stated motivations for enrollment, graduation options, and reasons, the specific discrepancies between the project's macro goals and the actual implementation outcomes, along with their underlying causes, were identified.

TYPIFICATION: FOUR STUDENT TYPES

By analyzing the textual information obtained from interviews, we gained insights into the specific implementation of the program from the perspectives of both the lecturer and students to uncover the genuine enrollment motivations as well as the study behaviors and career choices of students participating in this project. Since students' enrollment motivations and study behaviors ultimately manifest in their career choices, these choices constitute the basis for categorizing the students into the four types—namely, enterprise-oriented students (Type I), TVET researcher-oriented students (Type II), TVET teacher-avoiding students (Type III), and TVET teacher-oriented students (Type IV). The varying career choices made by these four student types can reveal the discrepancies between the macro goals and the actual implementation of the teacher training program under investigation. In the following, we discuss the differences between the expected objectives on the macro level and specific actions at the micro level performed by the four types (Table 4).

Enterprise-oriented students (type I)

According to the interviews, most undergraduate students who graduated from the Sino-German TVET teacher training program choose to work at enterprises after acquiring their degree. We, therefore, refer to them as "enterprise-oriented students". For these students, the motivations for their enrollment were not necessarily rooted in the aspiration to become a TVET teacher. Moreover, as revealed in the interviews, some students were not aware that the objective of the program is to cultivate TVET teachers before applying: "We weren't very clear about what this major entailed when filling out our applications. We actually didn't know much about it. Around 10 years ago, information was relatively limited and inaccessible" (S1).

The enterprise-oriented students' main motivation was to gain admission to Tongji University through the advanced batch admissions process, avoiding subsequent competition, and they did not consider TVET teacher training. Evidently, the admission system in China, particularly for very prestigious universities, is quite extreme. As stated by the interviewed lecturer: "Because the TVET teacher training program is in the advanced batch of the college entrance exam, many students want to get in early, so they don't have to compete in the first-batch admissions" (L1).

Since the motivation for enrollment did not stem from the expectation of being a secondary TVET teacher, some enterprise-oriented students chose to change majors after enrollment, deviating from the path of becoming a secondary TVET teacher. However, due to the quantitative limitations on major changes, most students were unable to transfer to other faculties. Even those who remained in the TVET teacher program

Table 4: Overview of the four student types in the program

Typification	Type I	Type II	Type III	Type IV
Orientation	Enterprise	Research	Avoiding TVET	TVET teacher
Admission intention	Entering Tongji University in the early batch	Entering Tongji University in the early batch	Unaware of the implications of the major	Entering Tongji University in the early batch
Mindset	Pursuing a higher salary	Pursuing a higher education	Anything but becoming a TVET teacher	Stability
Study behavior	Low investment in studies or switch majors (for better career prospects)	Highly invested in studies	Drop out or switch majors (conceivably with a lower status)	Highly invested in studies
Career option	Completing the program but acquiring another job	Utilizing the opportunities of further studies (abroad)	Leaving before graduation	Becoming a TVET teacher in the Greater Shanghai area
Numbers	High	Low	Very low	Relatively low
Macrolevel effect towards the objectives	None	None	None	Yes (long term)
Interviewees representing the type	S1	S2 and S3	-	S4
Interviewees as informants	S1-S4 and L1	S2, S3, and L1	S3 and L1	S1-S4 and L1

TVET, technical and vocational education and training.

demonstrated a casual attitude towards learning and invested less effort in their studies, owing to their lack of interest in education in general and TVET in particular:

"My intention was not to become a teacher, so I didn't put much effort into it. As for educational practice courses, I basically treated them as tasks to complete. Frankly speaking, I didn't invest much in them because everyone knew that we would not pursue teaching as a career. At most, we treated it as a part-time job" (S1).

It can thus be inferred that due to the lack of learning motivation, the courses within the program have not achieved satisfactory teaching outcomes, failing to enhance the students' willingness to become secondary TVET teachers. Furthermore, students' learning attitudes also have a negative impact on teachers' enthusiasm for teaching. According to the interviewed lecturer: "Because they are unwilling to become TVET teachers, they are not interested, which makes teaching exhausting. They are busy with their major subjects during class, spending more time on civil engineering or electrical engineering to improve their proficiency. Teachers prepared their lessons very carefully, but students' minds did not focus on this" (L1).

Consequently, against the backdrop of a booming construction industry and a high demand for talent in various other industries, the status and value of TVET have not been fully recognized. Influenced by this social atmosphere, these students believe that becoming a secondary TVET teacher cannot match the hard work they had put in over the past ten years of their studies. Hence, they tend to choose employment in enterprises related to their original majors: Mechanical Engineering and Automation, Electronic Information Engineering, Civil Engineering, and Business Administration. A student noted: "Most of us chose to develop in our original majors. This was related to the societal perception of TVET. We all worked hard to secure admission to a top-tier 985 university" (S1).

Moreover, students' choice of employment in enterprises was also influenced by the professional development prospects and salary levels, as a teaching career in China would lead to a secured but comparatively low income. As one student mentioned: "At that time, the salary of a civil engineer was much better than that of a secondary TVET teacher. And 20 years ago, Tongji's civil engineering program was excellent. If you were in my shoes, you would prefer to be a civil engineer" (S3).

The focus on the program's secondary major is plausible, as graduates of the undergraduate program entered into a competitive relationship with graduates from those majors (which entirely focused on one subject) in terms of career pathways, deviating from the program's differentiated training objective of cultivating professional teachers. As stated by the interviewed lecturer: "When students graduate but don't become teachers, they enter an enterprise, competing with students from other majors. For instance, graduates of the (TVET teacher) civil engineering major compete with graduates of the civil engineering program for job opportunities" (L1).

In summary, enterprise-oriented students exhibit deviations from the program's intended objectives in terms of their enrollment motivation, learning performance, and career choices. Due to the initial deviation in motivation and a subsequent lack of interest, the teaching effectiveness of the program's courses is limited. Coupled with the social environment

characterized by rapid infrastructure development and discrimination against TVET, Type I students generally choose to pursue careers in enterprises upon graduation.

Research-oriented students (type II)

Aside from those who choose to work in the corporate world, some students choose to continue their studies and enter academia. For those students, their motivation for enrollment was also not based on an interest in becoming TVET teachers but rather on the desire to access Tongji University. As an interviewed student said: "My personal thought is that Tongji University is a great institution, and I want to be part of it. That was my main motivation. Regarding becoming a TVET teacher, I didn't have a particularly strong aspiration for it" (S2).

Influenced by the traditional mindset that links higher education with higher salaries, some research-oriented students have a clear intention to pursue further studies even before their enrollment. As stated by one of the interviewed students: "In 2015, our graduation options were categorized into different tiers, with further studies being the top tier. Even though pursuing postgraduate studies would take several years, the returns would be much higher" (S1).

Furthermore, as these students are inherently academically excellent, even if they are uncertain about their future careers, their habit of diligent learning ensures that they maintain a high level of academic engagement, propelling them towards further studies: "I didn't have a clear plan at that time. I was just qualified for the postgraduate university recommendation program, so I continued my studies" (S3).

Additionally, the low entry threshold for secondary TVET teachers created a mismatch with Tongji University's undergraduate degree, leading students to believe that they deserved better career choices. As an interviewed student stated: "The recruitment standards for secondary TVET teachers were not as stringent as they are now. So we felt that graduating from Tongji might lead to better opportunities" (S2).

Moreover, due to the theoretical and abstract nature of educational courses, they pose a certain degree of difficulty for students majoring in science and engineering. As stated by an interviewed student: "I find the theories in educational courses quite incomprehensible. Our university teachers, who have returned from studying in Germany, tend to emphasize theory even more. In fact, the courses were all about cutting-edge German TVET, but they were abstract, boring, and highly intricate, making them difficult to study" (S2).

It can be observed that the courses of this program also pose difficulties for students with good study habits, and there is a certain gap between the expected teaching effect and the actual situation.

To sum up, due to the traditional pursuit of higher academic qualifications and the reinforcement of their own good study habits, some Type II students were motivated to further studies before enrollment, while others gradually developed this intention after enrollment, ultimately embarking on the pathway of academic research. The program's curriculum poses certain difficulties even for students with a good learning attitude, and in terms of graduation options, such students are also dissatisfied with becoming secondary TVET teachers. The enrollment motivation, learning interests, and graduation options of these students all deviate from the expected goals of the program.

TVET teacher-avoiding students (type III)

Some students were unaware of the TVET teacher training objective of the program before enrollment and were solely attracted by the platform of Tongji University. After entering the university, they became aware of the program objectives, coupled with the realization that previous cohorts of students were secondary TVET graduates, and a sense of being deceived emerged among some. They found it unacceptable to envision a future as secondary TVET teachers. Consequently, driven by the profound sense of disparity, these students opted to drop out directly and retake the college entrance examination or transfer to other majors. As an interviewed student stated: "Before we enrolled, none of us knew what the 'TVET teacher part' of the major meant. Many of us came in as top students in our counties, but when we learned that it used to recruit graduates from secondary TVET schools, it was a huge disappointment. About 10 people from our cohort dropped out and later got admitted to Tsinghua University or Peking University" (S3).

Besides dropping out, some students opted to transfer to other majors to alleviate their sense of disillusionment, even if the quality of those majors was not that good. As an interviewed student said: "When I was younger, the sense of underachievement was profound. I entered the mechanical engineering major (TVET teacher) with a higher score than the regular machinery major at Tongji. Given my high score, I wanted to transfer to another major" (S3).

Despite various restrictions on transferring majors, around an average of 10% of students still opted for that option. Therefore, the college's objectives can only focus on those who have not transferred majors, leading to a reduction in the number of students and a corresponding increase in the college's operational costs per student. As stated by an interviewed student: "The proportion of students transferring majors reached

around 10%. People choose to transfer because they have psychological burdens, thinking that they will become secondary TVET teachers in the future, which they didn't really want to do" (S1).

Furthermore, even if they failed to switch majors during their undergraduate studies, some students continued to strive for postgraduate entrance exams after graduation, seizing the opportunity to change majors again to fully avoid the possibility of becoming a secondary TVET teacher. Due to the lack of clarity regarding the objectives of this TVET teacher training program upon enrollment, some students choose to withdraw or change majors under the sense of disparity and attempt to avoid becoming a secondary TVET teacher as much as possible.

TVET teacher-oriented students (type IV)

According to the interviews, the number of graduates from this program who choose to become secondary TVET teachers is quite small. However, a small portion of students adopt the program's goal after completing postgraduate studies within the program. Among the master's degree students in TVET, a minority continue their academic pathway by pursuing doctoral degrees, and most eventually become lecturers in higher TVET colleges.

The primary reason for Type IV students becoming higher TVET college teachers is their preference for the relatively flexible work arrangement. In particular, female graduates emphasized that the stability of this job enables balancing family and work responsibilities. As stated by an interviewed student: "The nature of this job is very stable, allowing them to balance both family and work. Even though there may be better job opportunities at the time, there are still people who inherently prefer stable work" (S2).

For Type IV students, excellent study habits throughout their undergraduate years of study resulted in outstanding academic achievements that enabled them to continue their master's degree in TVET without an entrance examination. During their master's program, as their understanding of TVET deepened, they gradually confirmed their aspiration to become TVET teachers. According to an interviewed student: "While conducting my thesis research at a TVET college, I gradually realized that I preferred the flexibility and freedom offered by this profession. Being a teacher at a higher TVET college aligns with my personal preferences" (S4).

In the job market, seeking teaching positions at higher TVET colleges, master's graduates from the program enjoyed a high degree of employment compatibility and recognition due to their background. As reported by an interviewed student: "My unique blend of professional background and understanding of TVET theory made me stand out. Most of my competitors for the same positions were Ph.D. holders. Employers appreciate the TVET teacher training model; they desire teachers who are not only proficient in their professions but also knowledgeable in educational methodologies" (S4).

Furthermore, upon completing their master's degrees in TVET, graduates often find themselves unable to compete with those of the original major in the corporate job market due to the lesser emphasis on knowledge of the original major during their master's program. As shared by an interviewed student: "Since I pursued a master's degree in education, my competence in mechanical engineering pales in comparison to others. I am not equipped to handle corporate work" (S4).

Consequently, most graduates from the master's program who do not proceed to doctoral studies opt to enter the education system, either in teaching or administrative roles. However, it is noteworthy that despite these students choosing to become teachers in higher TVET colleges, they, too, did not accept teaching positions in secondary TVET schools upon graduation from the undergraduate program. Their conscientious study and their choice to pursue postgraduate studies in the TVET major stem not from an interest in TVET but rather from the good habit of diligent learning. As expressed by an interviewed student: "Diligent study is just a habit. I would have been the same if I studied other majors. If I hadn't been accepted as a master's student, I might not have gone for a secondary TVET teacher position" (S4).

In their perception, being a secondary TVET teacher is still a lower option, with a notable disparity in social status compared to that of higher TVET teachers. According to an interviewed student: "The salary of the secondary TVET teacher was not high. I would prioritize corporate jobs. For us back then, higher TVET colleges seemed like universities, while secondary TVET schools felt more like high schools. It was like the difference between university teachers and primary school teachers, with secondary TVET teachers perceived as being of a lower tier" (S4).

Although this group of students eventually became teachers in higher TVET colleges, they still did not become secondary TVET teachers after completing their undergraduate degrees, deviating from the differentiated positioning of the program to cultivate secondary TVET teachers after undergraduate studies. According to the interviewed lecturer: "TVET teacher training at the undergraduate level led to problems with the survival of the college. The university recommended that the program should be discontinued, and it gradually disappeared around 2012, with training focused on the master's level" (L1).

In summary, Type IV students, due to their preference for stable employment and the consistent habit of studying diligently, continue to pursue a master's degree in the TVET teacher training program and subsequently opt for becoming higher TVET college teachers upon graduation. Although this is in line with the program's training objectives, the number of Type IV students is still very low.

DISCUSSION AND OUTLOOK

The original objective of the TVET teacher training program was to attract high-performing students to enroll and become TVET teachers in the Greater Shanghai area. We can conclude that while the program initially succeeded in attracting a cohort of outstanding students, due to deviations in their enrollment motivations, societal contexts, and traditional ideologies, the first three student types did not become TVET teachers. Only the Type IV students, motivated by job stability, became TVET teachers but mostly at the tertiary level in higher TVET colleges. Therefore, the outcomes of this program did not align with its objective, with discrepancies arising from students' diverse mindsets and behaviors. Ultimately, this led to the discontinuation of the undergraduate phase of this TVET teacher training program, with subsequent training focused on the postgraduate level.

In terms of the reasons, the economic environment, social perceptions, and contradiction between curriculum design and students' original professional backgrounds could all be responsible for this discrepancy.[18] First, given the booming construction industry, with the prosperous labor market, many companies offer very attractive salaries that are higher than teachers' salaries. Those who did not aspire to be secondary TVET teachers naturally chose to work for high-paying enterprises with better career prospects upon completing their undergraduate studies. Second, influenced by the traditional mindset of pursuing higher academic degrees,[19] some students chose to pursue master's degrees, with some opting for fields outside of TVET. Among those who continued their studies in the TVET field, some pursued doctoral qualifications and became TVET researchers, while others, upon completing their master's degrees, genuinely embarked on careers as teachers in TVET colleges, driven by their preference for job stability and the reputation of tertiary education. As for the TVET teacher–avoiding students, the influence of society's traditional perceptions of TVET is manifested in their decision to withdraw.[20,21] Being a TVET teacher is prescribed as a relatively low status within Chinese society.[22,23] Therefore, students are so resistant to becoming TVET teachers that they voluntarily withdraw from the program and/or choose another major. Regarding the curriculum, the courses related to German TVET offered by this program are relatively abstract and cutting-edge, for students whose original majors are in science and engineering, they find it challenging to study. Even the top-performing and highly motivated students in the class acknowledge the difficulty of the course content.

Drawing inspiration from the reasons underlying the students' actions, we can explore several viable alternatives to enhance the effectiveness of the program. Governmental bodies might contemplate the elevation of TVET teachers' salaries, increasing the salary ceiling, and narrowing the disparity with corporate salaries, thereby attracting a greater number of graduates to apply.[1,24] Furthermore, the curriculum within the program can be designed in a progressive manner (from simple to complex)—with educators employing real-life instances to convert abstract knowledge into concrete understanding, simplifying the learning process for students.[25] Also, as the Chinese TVET system does not share many similarities with the German dual apprenticeship model, the great emphasis on Germany as a role model should be reconsidered for China,[26,27] but also for other parts of the world.[28–30] Concurrently, there should be an appropriate augmentation in the promotion of the distinctive nature and significance of the TVET teaching profession, thereby fostering heightened recognition among students for this career path.[31]

However, this research inevitably has some limitations. As mentioned in the introduction, the four student types did not enroll at the same time, with the corresponding enrollment years being: S1 enrolled in 2010, while S2, S3 as well as S4 all enrolled in 2005. Nevertheless, the analysis demonstrates that even if the time frame is extended to five years and the external environment continues to change, what remains unchanged is that most students have not been willing to become TVET teachers, especially in secondary education, for most of the past three decades. Another limitation of this study is the limited number of interviewees—who were, however, chosen by careful selection. The groups of interviewees could be expanded for the sake of triangulation. For example, interviews with government officials and university leaders of the time could enrich the findings of this paper as well as the current understanding of international policy transfer and cooperation in TVET.

CONCLUSION

As an exemplary case of international policy transfer in the field of TVET, the teacher training program at Tongji University was jointly established by the German

and Chinese governments with the intention of cultivating high-quality teachers for vocational schools, drawing inspiration from the German TVET teacher training model. However, the study found that the training outcomes of the program did not match well with the original objectives. It is therefore crucial that policy transfer efforts pay close attention to the specific social, economic, and cultural contexts that directly or indirectly shape the various mindsets and actions at the micro level. This is too often neglected in the anticipation, design and implementation of TVET policy transfer.

DECLARATIONS

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Author contributions
Wenyu Cao: Conceptualization, Data curation, Formal analysis, Investigation, Resources, Writing—Original draft, Writing—Review and Editing. Johannes Karl Schmees: Conceptualization, Methodology, Formal analysis, Investigation, Resources, Writing—Original draft, Writing—Review and Editing, Visualization, Supervision. Jun Li: Conceptualization, Data curation, Validation, Formal analysis, Investigation, Resources, Writing—Original draft, Writing—Review and Editing, Supervision, Project administration. Janika Grunau: Conceptualization, Methodology, Resources, Writing—Review and Editing, Visualization. All authors have read and approved the final version of the manuscript.

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Data availability statement
Data (in Chinese) used to support the findings of this study are available from the corresponding author upon request.

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