Mentoring, Educational Preferences, and Career Choice: Evidence from Two Field Experiments in Bhutan*

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Abstract

We evaluate two randomized controlled trials in Bhutan testing whether near-peer mentoring can shift students' educational preferences toward STEM and TVET pathways. Mentors provided personalized guidance, shared their own experiences, and offered information on admissions and labor market outcomes. The interventions significantly increased students' interest and perceived knowledge, but had limited effects on actual applications or enrollment. In the STEM stream, limited follow-through appears linked to structural constraints such as academic selectivity and limited program capacity; for TVET, social stigma and parental skepticism likely played a constraining role. These findings highlight the potential of light-touch, scalable mentoring to shape aspirations, while underscoring the need for complementary strategies to support behavior change and enable follow-through.

Keywords: STEM, TVET, mentoring, educational preferences, career choices, Bhutan

JEL Codes: I23, I24, J4, J24

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1 Introduction

Extensive research highlights significant variation in labor market outcomes across both degree levels and fields of study (Altonji, Blom, and Meghir 2012; Kirkeboen, Leuven, and Mogstad 2016). These findings underscore the importance of supporting students in making well-informed educational decisions that shape their long-term career trajectories. This need is particularly acute in developing countries, where students and families often face substantial information gaps about labor market opportunities and the implications of different educational pathways.

This paper contributes to the literature by presenting one of the few large-scale randomized controlled trials (RCTs) of a promising career mentoring intervention designed to improve students' understanding of educational options and labor market outcomes in a developing country. Our study takes place in Bhutan, where limited access to career information is a key factor contributing to rising youth unemployment (UNDP 2023), which surged from 11.9% in 2019 to 20.6% in 2021, and reached a record high of 27.2% in 2022 (ILO 2024). A weak career counseling infrastructure further exacerbates these challenges. Although career counseling was introduced in 1996, the system remains underdeveloped. Teachers often serve dual roles as educators and counselors, limiting their ability to offer effective guidance (Ministry of Education and Skills Development 2024a).[1] Moreover, counseling efforts typically emphasize personal development over structured career planning, leaving students to rely on informal or outdated sources of advice.

The intervention aimed to provide students with both practical information and relatable guidance, supporting them in making informed decisions aligned with their academic interests and long-term career aspirations. For Grade 10 students, who must choose whether to pursue the science stream–a prerequisite for many Science, Technology, Engineering, and Mathematics (STEM) college majors–mentors were STEM undergraduates or graduate students. For Grade 12 students considering Technical and Vocational Education and Training (TVET), mentors were either current

[1] Previously, education and labor were overseen by separate ministries–the Ministry of Education and the Ministry of Labour and Human Resources. In 2022, these were merged to form the Ministry of Education and Skills Development (MoESD). In this paper, ministry names reflect the institutional structure in place at the time each document was produced.

TVET students or alumni. The mentoring involved one-on-one sessions where students received standardized information on entry requirements, application processes, labor market outcomes, and career prospects. In addition to sharing factual knowledge, mentors offered personal insights from their own experiences, helping students view these educational pathways as both attainable and worthwhile. Although not formally trained, many mentors had prior informal mentoring experience, such as assisting peers with schoolwork or providing educational advice. To maintain consistency, all mentors underwent standardized training focused on communication and facilitation skills. Over the course of one month leading up to final exams, each mentor-mentee pair met for approximately four hours to discuss various topics.

The two educational pathways examined here–STEM and TVET–differ significantly in terms of accessibility, social perception, and academic demands. STEM is highly regarded and attracts strong student interest, but many students lack accurate information about prerequisites and outcomes, leading to misinformed choices. In contrast, TVET is often stigmatized despite providing valuable career opportunities. By studying both tracks, we aim to examine how structured guidance and improved information affect student preferences and decisions across two contrasting educational contexts. This dual focus enables a broader understanding of how mentoring can support students in navigating complex choices.

To evaluate the intervention, we conducted two separate RCTs: one in 76 schools with Grade 10 students for the STEM program and another in 36 schools with Grade 12 students for the TVET program. In the first stage, schools were randomly assigned to treatment or control groups. In the second stage, within treatment schools, students were randomly assigned to either the treatment group (directly mentored) or the spillover group (not mentored but in the same school). Students in control schools serve as the pure control group. This design allows us to measure both the direct effects of mentoring and potential spillover effects within schools.[2] Treated students were then randomly paired with volunteer mentors from the same geographic areas. In total, the STEM program included 200 mentors and 1,000 mentees, while the TVET program involved 140 mentors

[2] Similar research design that allows measuring potential spillover effect has been widely used in other contexts, for example, cash transfer programs (Haushofer and Shapiro 2016).

and 700 mentees.

Our findings indicate that the STEM mentoring program substantially increased students' interest in science-related fields and positively shaped their attitudes. Grade 10 students in the treatment group were approximately 16 percentage points more likely to choose the science stream as their first preference, compared to 44% in the control group–a 36% relative increase. Students in the same schools who did not directly receive the mentoring also showed increased interest, though the effect was smaller, representing a 10% relative increase. The program enhanced students' perceptions of science, including their subjective knowledge of the field, their sense of social support from parents, peers, and society, and their expectations regarding their ability to succeed in the science stream. While there were modest improvements in academic effort–as reflected in higher test scores and graduation exam pass rates–the program did not translate into a significant change in students' final enrollment outcomes. Specifically, we find no statistically significant increase in the likelihood of students enrolling in the science track in the subsequent academic year.

The TVET mentoring program yielded similar results in terms of improving student awareness and interest. Among Grade 12 students in the treatment group, the proportion who ranked TVET among their top three career preferences increased by approximately 6 percentage points, from a control group mean of 19%–a 32% relative increase.[3] A similar effect was observed among untreated students in treatment schools, who showed a 21% increase relative to the control mean. The intervention improved students' understanding of TVET, including its application process, the experience of being a TVET student, labor market outcomes, and employment prospects. However, it did not significantly influence other intermediate outcomes, such as attitudes toward blue-collar work, perceptions of social approval, peer preferences, and students' self-confidence in pursuing TVET. Likewise, the program did not significantly affect students' actual post-secondary decisions: we find no statistically significant effects on applications to, admissions into, or enrollment in TVET institutions nine months after the intervention.

We discuss several structural and contextual factors that could help explain the patterns ob-

[3]We focus on the top three preferences due to the consistently low incidence of TVET being selected as the first choice in both baseline and follow-up surveys.

served in our findings. In the case of the STEM mentoring program, while the intervention successfully elevated students' interest in the science stream, structural barriers such as limited capacity and stringent admission criteria likely constrained students' ability to act on these aspirations. The science track in Bhutan remains academically rigorous and highly selective, and despite increased motivation and modest gains in academic effort, students may have lacked the foundational preparation or external support needed to translate interest into enrollment. These challenges were compounded by the short window between the intervention and high-stakes national exams, as well as by disruptions from the COVID-19 pandemic. Qualitative evidence from mentor-mentee discussions further suggests that students faced emotional and academic stress that may have limited performance gains despite greater engagement.

In contrast, the limited effect of the TVET mentoring program on students' final decisions appears more rooted in social stigma and family dynamics. While the program improved knowledge and interest in TVET, it did not shift broader perceptions of social approval or reduce students' hesitation toward blue-collar work. In Bhutan, vocational education is often perceived as a less prestigious option, a view reinforced by limited parental endorsement. The absence of observed changes in perceived parental approval, unlike in the STEM arm, suggests that student-only interventions may not be sufficient to overcome entrenched biases. Mentor-mentee conversations reflected a more defensive tone, with students focusing on the legitimacy of TVET rather than expressing enthusiasm. These patterns underscore the importance of designing interventions that also engage families and challenge societal narratives, especially for pathways like TVET.

Our paper contributes to the literature on mentoring interventions aimed at guiding students' educational and career decisions, particularly in low-income settings. While youth mentoring programs are common, rigorous evidence on their causal effects–especially when delivered as standalone interventions–remains limited.[4] Most studies focus on comprehensive programs where mentoring is combined with other elements like tutoring, financial incentives, or behavioral training, making it challenging to isolate the effects of mentoring itself. For instance, the Quantum

[4] See Rodriguez-Planas (2014) for a review of earlier evidence from high-income contexts.

Opportunity Program in the U.S. (Rodriguez-Planas 2012) and a program in Argentina (Ganimian, Barrera-Osorio, Biehl, and Cortelezzi 2020) include mentoring alongside financial support, while studies by Heller et al. (2017) and Oreopoulos, Brown, and Lavecchia (2017) combine mentoring with cognitive-behavioral therapy, tutoring, group activities, and scholarships.

Even when mentoring is the main focus, the evidence is mixed. Some studies show positive impacts, such as increased college enrollment among female students (Carrell and Sacerdote 2017), higher likelihood of entrepreneurship among students without prior experience (Eesley and Wang 2017), improved labor market outcomes for students from low socioeconomic backgrounds (Resnjanskij et al. 2024), higher academic track placement for disadvantaged youth in Germany (Falk, Kosse, and Pinger 2020), and improved school-to-work transitions of vocational trainees in Uganda (Alfonsi, Namubiru, and Spaziani 2024). Other studies report more limited effects. For example, in France, career mentoring programs shifted students' ambitions but did not affect their career plans, professional knowledge, or motivation (Behaghel, Chiodi, and Gurgand 2017). Similarly, a structural monitoring and mentoring program in Chicago improved school attendance but did not produce any significant gains in learning outcomes (Guryan et al. 2021).[5]

In contrast, our study evaluates a low-cost, scalable, stand-alone mentoring program delivered by near-peer role models. This intervention is designed to fit within the existing education system, without the need for professional counselors. Despite its modest intensity–just four hours over the course of one month–the program led to meaningful shifts in students' interests, self-perceived knowledge, and attitudes toward STEM, as well as an increased understanding of TVET. These findings provide new evidence on the effectiveness of targeted, low-intensity mentoring in shaping students' preferences, particularly in resource-constrained environments. By offering a scalable and operationally feasible model, our study highlights the potential of light-touch interventions to guide students toward more informed and realistic educational decisions.

Second, by examining two distinct educational pathways–STEM and TVET–our study highlights how social perceptions and institutional constraints shape the effectiveness of mentoring.

[5] We compare and contrast our mentoring program with other interventions in Appendix A1.

Our results suggest that shifts in interest and attitude do not always translate into concrete decisions when deeper barriers persist. In the STEM pathway, structural factors such as academic selectivity limited students' ability to act on their new aspirations. In the TVET pathway, stigma and limited parental support appeared to dampen the impact of increased awareness. These findings align with recent literature emphasizing the role of non-pecuniary factors–like parental approval and personal beliefs–in shaping educational choices (Delavande and Zafar 2019). Earlier studies indicate that providing disadvantaged students with accurate labor market information, especially when they hold misconceptions, tends to lead to changes in their beliefs and decisions (Hastings, Neilson, and Zimmerman 2015; Wiswall and Zafar 2015a,b; Baker, Bettinger, Jacob, and Marinescu 2018; Kerr, Pekkarinen, Sarvimäki, and Uusitalo 2020). Our study emphasizes the significance of understanding these non-pecuniary barriers, which often overshadow the impact of accurate information.

Third, our study highlights the value of near-peer mentors as role models. Unlike traditional role model interventions, which typically feature distant success stories (e.g., Porter and Serra 2020; Riley 2024), our design leverages the influence of relatable figures from similar backgrounds, demonstrating how they can inspire students and motivate changes in behaviors like academic effort.[6] This approach is especially pertinent in Bhutan, where formal career counseling is underdeveloped, and students have limited access to accessible success stories. The positive response to mentors–particularly those who are still on their own educational journeys–adds a nuanced perspective to the literature on aspiration formation and role models in developing countries.[7]

From a policy standpoint, our study offers both optimism and caution. Light-touch mentoring is scalable, affordable, and can be integrated into existing school systems with relatively little infrastructure. Its effects on awareness and aspiration are meaningful, especially in information-poor

[6] The intervention also relates to the concept of "aspiration windows," which suggests that individuals form their aspirations by observing the achievements of peers or role models they perceive as attainable (Ray 2006). This idea aligns with Bandura (1997)'s theory of "vicarious learning," which highlights how observing the success of similar others can enhance self-efficacy and motivate goal-setting.

[7] See Mani and Riley (2019) and Serra (forthcoming) for a discussion of role models, along with the references cited therein for evidence from developing countries. Similarly, Calsamiglia, Garcia-Brazales, and Loviglio (2024) underscores the importance of aligning mentor characteristics with students' preferences, which can enhance engagement and improve program outcomes.

environments. However, the lack of consistent downstream behavior change points to the need for complementary strategies, particularly in addressing social stigma and structural access barriers. For TVET, this may mean engaging families, communities or rebranding vocational education. For STEM, supporting academic preparation and enhancing program capacity may be necessary.

2 Background

2.1 The Education System and Career Guidance in Bhutan

The Bhutanese education system, as illustrated in Figure 1, comprises 11 years of basic education, from pre-primary to Grade 10. At the end of Grade 10, students take the national Bhutan Certificate for Secondary Education (BCSE) examination. To earn a BCSE PASS certificate, students must meet the requirements of two components: (i) continuous assessment (CA), and (ii) a written board examination (THEORY). The CA component, reported by local teachers, captures aspects of student learning not fully reflected in a standardized two-hour exam. It includes factors such as class attendance, homework completion, conduct, weekly test performance, class participation, and presentations. The THEORY component is based on a centralized national written exam.[8]

Following Grade 10, students have two primary pathways for further education: general education in higher secondary schools, or vocational education at technical training institutes. Admission to public higher secondary schools and academic streams is based on BCSE performance. Students who do not qualify for public school placements may attend private schools or pursue vocational training at public or private institutions.

At the higher secondary level, students must choose one of four academic streams: arts, commerce, science, or Rigzhung (Bhutanese culture and tradition). Students in the science stream are eligible for a broader range of STEM-related majors at the tertiary level, where admission requirements often include strong performance in mathematics and science subjects. At the end of Grade 12, students take the Bhutan Higher Secondary Education Certificate (BHSEC) examination.

[8] This revised assessment structure was introduced in June 2021, just prior to the study period. Under the previous system, students could pass based on the combined total of both components. https://thebhutanese.bt/new-assessment-criteria-to-continue-says-pm/.

After Grade 12, students may apply to tertiary institutions or technical training institutes. Admission to public tertiary institutions is primarily based on BHSEC results.[9] By contrast, enrollment in public technical training institutes is typically based on academic performance at Grade 10.[10]

While students face several key decision points–such as selecting academic streams or choosing between tertiary and vocational pathways–many navigate these transitions with limited formal support. Despite growing policy recognition of the importance of career guidance in shaping educational and occupational choices, counseling and guidance services in Bhutan remain limited, particularly at the secondary school level.

Formal efforts began in 1996 with the introduction of the first guidance and counseling programs, followed by the establishment of the Career Education and Counselling Division in 2003. However, progress has been slow. Throughout this period, teacher-counselors often had to juggle counseling responsibilities alongside full-time teaching duties, limiting both the effectiveness and reach of these services. By 2011, only 12 full-time in-service guidance counselors had been deployed to higher secondary schools nationwide (Ministry of Education and Skills Development 2024a).

The current counseling system remains focused primarily on developmental and psychosocial support, addressing personal issues, crisis management, social relationships, and emotional well-being. Structured career guidance–particularly programs that help students explore educational pathways, labor market trends, and long-term planning–remains scarce (Ministry of Labour and Human Resources 2022).

Until 2022, Bhutan lacked a national framework for career development. The launch of the National Strategy on Career Guidance marked the first coordinated effort to close this gap (Ministry of Labour and Human Resources 2022). However, implementation remains in its early stages.

[9] For example, admission to the Bachelor of Data Science program at Sherubtse College in 2022 required science-stream students to hold a BHSEC pass certificate and score at least 55% in mathematics. For the Bachelor of Life Science program, the requirements included 55% in biology and 45% in chemistry (Sherubtse College, Admission into RUB Programmes for the Academic Year 2024, https://www.sherubtse.edu.bt/admission/).

[10] For instance, the minimum qualification for the Automobile Mechanic NC II program at the Technical Training Institute in Thimphu is a pass in the BCSE (http://www.education.gov.bt/?p=79367).

In the absence of comprehensive school-based career support, students often rely on informal sources such as parents, peers, and teachers. While well-intentioned, these sources may reinforce narrow or outdated views of viable career options. This challenge is especially acute in a rapidly evolving labor market, where emerging opportunities in technical and non-traditional fields are often overlooked due to social stigma or limited awareness.

These limitations make the introduction of a formal mentoring program–such as the one examined in this paper–particularly timely. In addition to providing accurate information on entry requirements, application procedures, labor market outcomes, and career prospects, the program also addresses key gaps in Bhutan's guidance infrastructure by offering personalized support and access to relatable role models.

2.2 Labor Market Outcomes and General Perception of TVET and STEM

Technical and Vocational Education and Training (TVET). Despite promising labor market prospects, Bhutan's vocational training system remains underappreciated by students and parents. According to reports from the Bhutan's Ministry of Labor and Human Resources (2020) and Ministry of Education (2019), only 845 students enrolled in vocational institutes in 2019, compared to over 12,000 students in tertiary education. A survey of 57 out of 89 higher secondary schools revealed that just 17% of Grade 12 students and parents ranked a TVET degree among their top three educational choices after graduation (Hayashi, Matsuda, and Yageta 2023).

This hesitancy stems partly from widespread misperceptions about post-graduation employment prospects. For example, the 2021 Labor Force Survey (LFS) reports that 90% of TVET graduates are employed by age 30, yet survey respondents estimated that only 50% would secure jobs (Hayashi, Matsuda, and Yageta 2023). Additionally, over 70% of graduates with a National Certificate II or higher found employment within one year of graduation (Ministry of Education and Skills Development 2024b). Female TVET graduates often achieve employment rates and salaries comparable to–or even exceeding–those of female arts and social sciences bachelor's degree holders, yet such achievements remain under-recognized in public perceptions (Hayashi, Matsuda, and

Yageta 2023).

These findings point to a disconnect between actual labor market outcomes and public perceptions of vocational education. Addressing these misbeliefs is critical for enhancing the appeal of TVET programs and aligning educational choices with the country's labor market needs.

Science, Technology, Engineering, and Mathematics (STEM). In stark contrast, STEM education is highly valued among Bhutanese students and parents. Over 60% of Grade 12 students ranked STEM-related bachelor's programs as their top choice for tertiary education, according to the same survey (Hayashi, Matsuda, and Yageta 2023). This preference is largely driven by perceived advantages in employment and income for STEM graduates.

The 2021 LFS confirms that STEM graduates consistently enjoy lower unemployment rates and higher average salaries compared to their counterparts in arts, humanities, and social sciences. However, some misbeliefs persist. For instance, over 75% of surveyed Grade 12 students and parents overestimated the salary levels of bachelor's degree holders in engineering fields (Hayashi, Matsuda, and Yageta 2023).

These inaccuracies suggest that while STEM's appeal is strong, decisions may still be influenced by incomplete or exaggerated perceptions of labor market outcomes. Bridging this gap with more accurate information could help ensure that students' educational aspirations align more closely with realistic opportunities in STEM fields.

3 Mentoring Intervention and Experimental Design

In 2021, Bhutan's Ministry of Education and Skills Development, in collaboration with the Asian Development Bank, implemented two field experiments targeting Grade 10 and 12 students across public and private schools nationwide. These experiments focused on mentoring interventions designed to guide students in their decision-making regarding postsecondary education, particularly in STEM and TVET pathways.

The primary goal of these mentoring programs was to address gaps in students' understanding and decision-making about their educational choices. While interest in STEM is relatively high, the competitive nature of the science track in Bhutan, shaped by capacity constraints and stringent academic requirements, limits many students' ability to pursue this path. The STEM mentoring program, therefore, aimed to motivate students to engage more seriously with science subjects, set higher academic goals, and increase their efforts to meet the necessary requirements for STEM enrollment. Given the capacity constraints in STEM programs, the mentoring is not expected to result in immediate, large-scale shifts in enrollment. Rather, the intervention targets the margin of motivation, interest, and preparation, helping students attain the academic level needed to meet these high barriers. This focus aligns with Bhutan's broader policy objectives, including the National Education Strategy's emphasis on strengthening STEM education to support national development goals. In contrast, the TVET mentoring program addresses different barriers, particularly informational obstacles, and is expected to generate more immediate responses, such as increased interest and engagement with TVET pathways.

3.1 Sample Recruitment, Randomization, and Timeline

The timeline of our study is illustrated in Figure 2. Baseline surveys were conducted during the summer of the 2021–2022 academic year, alongside the recruitment of mentors. Mentors for Grade 10 students were undergraduate and graduate students pursuing degrees in STEM fields (referred to as STEM mentors), while mentors for Grade 12 students were TVET students or recent graduates (TVET mentors).[11]

Mentor applicants were evaluated based on Grade 12 performance (60%), leadership experience (20%), participation in literacy activities (5%), and merit-based achievements (15%). From 320 STEM and 174 TVET applicants, the top 200 STEM and 140 TVET candidates were selected,

[11] STEM mentors were selected based on the following criteria: (i) enrollment in a bachelor's or master's program in STEM at one of six colleges—College of Natural Resources, College of Science and Technology, Gyalpozhing College of Information Technology, Jigme Namgyel Engineering College, Sherubtse College, or Royal Thimphu College; and (ii) a minimum grade 12 academic performance of 65%. TVET mentors were required to (i) be enrolled in or graduated from one of five TVET institutes—TTI Khuruthang, TTI Samthang, IZC Thimphu, TTI Thimphu, or IZC Trashiyangtse; and (ii) have achieved at least 45% in grade 12. For further details, see Appendices D1 and D2.

with additional backups in case of withdrawal.[12]

In addition to meeting the eligibility criteria, mentors varied in their demographic and experiential backgrounds. On average, mentors were 22 years old, with ages ranging from 18 to over 30. Among the STEM mentors, 58% were male, while 74% of the TVET mentors were male. The majority of STEM mentors were current college students, while most TVET mentors were still enrolled in training, with only 10% having graduated before 2020. Many mentors had prior experience with mentoring, either as former mentees or through informal support roles. Nearly half (48%) of Grade 10 mentors and 52% of Grade 12 mentors had themselves been mentored. In terms of providing support, over 75% of STEM mentors had helped at least three other students with math or science schoolwork, and nearly 40% had supported more than ten. Only 4% reported no prior mentoring experience. Furthermore, more than 85% of STEM mentors had shared information about STEM education with other students or assisted them with university applications in the past. Among TVET mentors, 42% had provided career guidance to at least three peers, and 17% had supported more than ten, while 18% had no prior experience. Mentors also expressed high satisfaction with their own educational paths, with over 80% of STEM mentors and more than 90% of TVET mentors stating they would recommend their programs to friends or siblings.

To define the school sample, we used baseline survey data to identify 76 schools with Grade 10 students located within a three-hour drive of one of six STEM colleges.[13] These schools were stratified by geographic location, total enrollment, and public/private status, and then randomly assigned to 36 treatment and 40 control schools. Similarly, for the Grade 12 cohort, we selected 36 schools near one of five TVET institutes or Institute of Zorig Chusum (IZC), stratified them along the same dimensions, and randomly assigned them to 17 treatment and 18 control schools.[14] A map showing the spatial distribution of the sample schools, colleges, and institutes is provided in

[12]Leadership experience refers to having served as a school or class monitor, literary participation includes activities such as debates, quizzes, or impromptu speeches, and merit-based achievements are recognized through certificates for accomplishments like being a subject topper or maintaining 100% attendance.

[13]These include the College of Natural Resources, College of Science and Technology, Gyalpozhing College of Information Technology, Jigme Namgyel Engineering College, Sherubtse College, and Royal Thimphu College.

[14]The five TVET institutes are TTI Khuruthang, TTI Samthang, IZC Thimphu, TTI Thimphu, and IZC Trashiyangtse. IZC specializes in traditional Bhutanese arts and crafts.

Appendix Figure A1.

Within each treatment school, students were further randomly divided into two groups: the treatment group and the spillover group. Students in the treatment group were paired with mentors from the same geographic area, with each mentor assigned five mentees.[15] Students in control-only schools are referred to as *control students*, those assigned as mentees in treatment schools as *treatment students*, and those not assigned mentee roles in treatment schools as *spillover students*. Treatment students were given the option to opt out of the mentoring program, and mentee slots that were declined were not reassigned.

The final analysis sample for the STEM mentoring program consisted of 1000 treatment students, 2443 spillover students, and 3015 control students. For the TVET mentoring intervention, the sample included 700 treatment students, 2171 spillover students, and 2669 control students.

Our sample restriction was primarily driven by logistical considerations. The mentoring programs were initially designed for in-person delivery to foster meaningful engagement between mentors–university or TVET students, and recent graduates–and mentees. Proximity to schools was essential to facilitate one-on-one meetings over a month, especially given Bhutan's mountainous terrain and the voluntary nature of mentor participation. In addition, while the baseline survey did not directly record students' grade levels, we supplemented it with administrative rosters from schools to identify eligible students. Because not all schools provided these records, the final sample was further narrowed to those with both logistical feasibility and usable administrative data. While this may have excluded more remote or less responsive schools, comparisons with the broader baseline sample show only modest differences across key characteristics, with no evidence of systematic selection (Appendix Tables A2–A3).

The mentoring intervention was implemented in November 2021. The first follow-up survey was conducted in March–April 2022.[16] A second follow-up survey took place in Septem-

[15]In consultation with government officials and relevant stakeholders, mentors and mentees of different genders could be paired together. Mentors were required to undergo a training session in which codes of conduct were introduced and discussed. See more details in Appendix D3.

[16]Initially, we planned to administer the first follow-up surveys shortly after the mentoring program's conclusion and prior to their final exams in December 2021. However, the outbreak of the COVID-19 pandemic led to a postponement.

ber–October 2022, only targeting the baseline 12th graders–who had finalized their decisions regarding tertiary and vocational education pathways.

3.2 The Intervention: Career Mentoring

The mentoring intervention paired secondary school students with volunteer mentors–university, TVET students, or recent graduates–to provide accurate, up-to-date information about STEM and TVET pathways. Each mentee took part in four one-on-one mentoring sessions, each lasting approximately one hour. Although sessions were initially planned to be conducted in person, the resurgence of COVID-19 and travel restrictions in late 2021 required a shift to a hybrid format. Ultimately, 45% of Grade 10 and 63% of Grade 12 sessions occurred face-to-face. Mentors were also encouraged to communicate with mentees outside of scheduled meetings via informal channels like messaging. This supplementary engagement occurred in 42% of Grade 10 and 50% of Grade 12 sessions, with 59% of Grade 10 mentors and 71% of Grade 12 mentors initiating such contact.

Mentoring sessions were designed to align with students' academic goals and concerns. Early meetings focused on understanding the mentees' post-graduation plans (secondary school for Grade 10 students and higher secondary school for Grade 12 students) and identifying any career-related concerns. Mentors introduced mentees to the STEM or TVET systems, shared relevant information about courses, and provided personal anecdotes about their educational experiences. Subsequent meetings explored labor market information related to each field of study, potential career paths for graduates, and practical aspects of navigating the STEM or TVET systems. Sessions also created space for students to raise individual questions and receive tailored advice.

To prepare mentors for their roles, a five-day training was conducted prior to the intervention. Led by Ministry of Education counselors and guided by a local expert, the training covered ethical guidelines, effective communication techniques, mentoring strategies, and documentation protocols. Mentors received comprehensive materials outlining the structure of the STEM and TVET systems, including admissions processes, deadlines, and labor market information drawn from the 2018–2019 Bhutan Labor Force Survey. These data, disaggregated by gender and education level, helped mentors frame education choices within broader employment outcomes. Additional training details are included in Appendices D4 and D5.

Program implementation was tracked through short reports submitted by mentors after each session, documenting attendance, discussion topics, and mentee progress. These reports enabled real-time monitoring of delivery and content.

Based on these reports, session durations typically ranged from 45 to 60 minutes.[17] Commonly discussed topics included labor market information, career options, and entry requirements. Grade 10 mentees more frequently discussed course options and perceptions of STEM, while Grade 12 mentees focused more on application logistics (Figure 3). A nontrivial portion of discussions–categorized as "Others"–centered on broader academic and personal themes. Text analysis of open-ended responses shows that Grade 10 conversations often included exam preparation, motivation, study habits, and time management (Appendix Figure A3). In contrast, Grade 12 TVET mentoring featured discussions on vocational pathways, credentials, and navigating institutional landscapes (Appendix Figure A4). These highlight the mentors' broader advisory role in addressing not only information gaps but also students' goals, mindset, and broader educational outlook.

Both mentoring programs received strong positive feedback from participants. Among the 77.3% of Grade 10 mentees who completed the feedback survey, over 70% reported being satisfied or very satisfied with both their mentor and the program content, while fewer than 3.5% reported dissatisfaction. Similarly, fewer than 5% of the 346 Grade 12 respondents expressed dissatisfaction. Notably, 78% of Grade 10 and 66% of Grade 12 mentees indicated they were likely or very likely to remain in contact with their mentor, reflecting the program's relational strength and perceived value.

3.3 Data Collection and Variable Constructions

Surveys and Administrative Database. Our study draws on several data sources, including administrative test score data, the administrative enrollment database of Grade 11 and TVET students, and student surveys.

[17] See Appendix Figure A2 for additional details.

We conducted surveys with all Grade 10 and Grade 12 students before and after the mentoring programs. Between August and September 2021, students from 139 schools with Grade 10 cohorts and 86 schools with Grade 12 cohorts completed computer-based surveys in their respective school computer labs, under the supervision of teachers and enumerators. The surveys took approximately 40 minutes to complete.[18] Baseline surveys gathered information on demographics, self-reported academic performance, preferences, and beliefs about education and future employment.

The first follow-up survey was administered after the completion of the mentoring programs and prior to career decision-making. Like the baseline survey, it was conducted in school computer labs. The primary objective of this follow-up survey was to evaluate whether the program had influenced students' preferences, beliefs, and knowledge, particularly regarding the science stream and TVET system. Questions were informed by official government documents and included details about admission criteria, such as eligibility for public higher secondary school, entry requirements, and merit-based subject selection for the Grade 11 science stream. For Grade 12 students, additional questions addressed eligibility for TVET training programs and criteria for interview shortlists.[19]

To assess whether the program influenced students' educational choices, we conducted a second follow-up interview survey by phone in September 2022, after Grade 12 students had graduated and made their final educational decisions. Due to frequent changes in phone numbers and limited email access, we were able to locate 85% of the original sample.

In addition to survey data, we utilized administrative data on national exam test scores (BSEC and BHSEC), Grade 11 enrollment, and applications to and enrollment in TVET institutes. Grade 11 enrollment data are maintained by the Ministry of Education, while TVET data are managed by the Ministry of Labour and Human Resources. These datasets cover all students enrolled in both public and private institutions, allowing us to track students' final educational decisions in the subsequent academic year. However, there are limitations in the TVET database. While all public

[18] To ensure attentiveness, we included questions to measure students' understanding of concepts like probability, which were explained in the questionnaire.

[19] These questions are provided in Appendices E5 and E6.

TVET institutions are required to report data to the government, some had not fully integrated their records into the central TVET-MIS system at the time of this study. Additionally, some private TVET institutions are not obligated to report, and therefore, their data are not included. We estimate that approximately 27% of TVET applications were not captured in the TVET-MIS database. As a result, the findings regarding the final educational decisions of baseline Grade 12 students, based on administrative data (which assumes non-appearance in the database as non-application or non-admission), should be interpreted with caution.

Main Outcome Variables. Following the pre-analysis plans (AEARCTR-0008808 and AEARCTR-0008837), we evaluated the effectiveness of the mentoring program based on two primary outcomes: stated preferences and actual educational decisions.

For baseline 10th graders, stated preferences are measured by students' self-reported rankings of six educational options: the arts, commerce, science, Rigzhung streams, TVET, and the option to discontinue education after Grade 10. Similarly, for baseline 12th graders, we measure stated preferences using students' rankings of educational choices, including six university degree options, TVET, and the decision to discontinue education after Grade 12. Based on these rankings, we create indicators for whether the science stream is the top preference for Grade 10 students, and whether TVET is among the top 3 choices for Grade 12 students.

Our second key outcome focuses on actual educational decisions. To measure this, we create indicator variables to determine whether baseline 10th grade students enrolled in the science stream, and whether baseline 12th grade students applied to and enrolled in a TVET institute in the subsequent academic year. Given that the science stream is more competitive and requires better academic performance than other streams, we also examine whether the mentoring program encourages students to take relevant subjects, such as math and science, for the national graduation exam. Specifically, we use an indicator of whether baseline 10th graders passed the BSEC exam and their test scores as a proxy for student effort.

To understand the link between the mentoring program, students' stated preferences, and actual educational decisions, we also examine several intermediate outcomes. These include students' perceptions of science and technology, biases against women in STEM and blue-collar jobs, and both perceived and objective knowledge of the entry requirements and application processes for the two fields of study. Additionally, we assess students' expected satisfaction upon enrollment, their self-assessed ability to complete their studies, and their beliefs about parental, peer, and societal approval for enrolling in the science stream or a TVET program.

For each intermediate outcome, we report results using a composite index. We construct these indices by defining each outcome so that higher values indicate better outcomes, except for bias measures, where the reverse is true. We then compute simple average of all responses to each outcome's components before standardizing each outcome into a z-score. This is done by subtracting the control group mean for each cohort at the corresponding survey round and dividing by the control group's standard deviation. Details on the index components and the construction of these intermediate outcomes are provided in Appendix E.

3.4 Sample Description

Table 1 presents baseline summary statistics for the Grade 10 sample. The average age of students is 17 years, with 45% identifying as male. The majority of students come from low socio-economic backgrounds, with only 20.2% of students having fathers who hold a high school diploma or higher, and just 12.4% of students having mothers with at least a high school diploma. Consistent with previous surveys (Hayashi, Matsuda, and Yageta 2023), science and STEM-related college majors are highly valued by the students. Nearly 37% of students list the science stream as their top preference after completing grade 10, and STEM-related disciplines are among the top two choices for nearly 75% of the sample. On a 5-point Likert scale (where 1 represents "strongly disagree" and 5 represents "strongly agree"), students rated the importance of science and technology an average of 4.0 points. They also expressed agreement (3.9 out of 5) that choosing the science stream would likely be approved by their parents, peers, and society. Additionally, the average control student somewhat disagrees with biased statements about women in STEM fields and professional careers, scoring 2.2 out of 5.

Turning to the sample of 12th graders, students are 19 years old on average, and 43% of them are male (Table 2). Among the eight educational options, including six tertiary degrees, TVET, and discontinuing education after grade 12, roughly 3% choose TVET as top preference by genuine interest and if they had to make final decisions at the time of the survey. Considering TVET among their top three preferences, the shares of students increase to 21% by genuine interest and 18% if had to make decision.

In contrast to the 10th graders' perceptions of STEM and science stream enrollment, 12th graders, on average, believe there is only a 50% chance that their decision to enroll in a TVET institute will be approved by their parents, peers, and society. On a 5-point Likert scale (where 1 represents "strongly disagree" and 5 represents "strongly agree"), this cohort generally holds a positive view of science and technology, with an average score of 4.1/5. However, they also show a slight bias against blue-collar jobs, scoring 3.3/5. In both groups, students most frequently discuss their career choices with their parents, followed by friends, and then teachers or school counselors.

Our survey indicates that Grade 12 students in the sample hold systematic misconceptions about labor market outcomes associated with different educational paths. Figure 4 presents gender-disaggregated boxplots of students' belief errors regarding TVET degrees. The left panel shows errors in beliefs about population employment rates (in percentage points), while the right panel depicts errors in beliefs about population earnings (in log points). To compute these errors, we compare students' stated beliefs to official degree-specific statistics from the LFS, with negative values indicating underestimation of the true values.

The data show that both male and female students substantially underestimate the employment prospects of TVET graduates. Median errors for both groups are below -50 percentage points, with approximately 87% of students underestimating the employment rate and only around 10% overestimating it. The interquartile range spans roughly -70 to -30 points, highlighting considerable heterogeneity in beliefs. While a few outliers overestimate employment rates–more common among females–they remain relatively rare. The distributions across gender are broadly similar.

Beliefs about earnings (right panel) also display notable inaccuracies, albeit with smaller magnitudes. Median errors remain negative for both genders, indicating a general tendency to underestimate the earning potential of TVET degrees. About 65% of students underestimate earnings, while 25% overestimate, and 10% are approximately accurate (within ± 0.1 log points). Female students show a slightly more pessimistic median belief than males.

Together, these patterns point to a widespread and consistent underestimation of the returns to TVET education, rather than gender-specific distortions. This highlights a critical information gap that may affect students' educational and career choices. In this context, targeted interventions–like the mentoring program studied in this paper–can play a crucial role in bridging these informational deficits and supporting more informed decision-making.[20]

4 Design Validity and Empirical Analysis

In this section, we assess the validity of the experimental design and describe the empirical analysis, following the pre-analysis plans registered as AEARCTR-0008808 and AEARCTR-0008837.

4.1 Design Validity

Baseline Balance. We test for baseline differences between treatment, spillover, and control groups using the following specification:

$$y_{isz0} = \beta_0 + \beta_1 \text{TREAT}_{is} + \beta_2 \text{SPILL}_{is} + \delta_z + \varepsilon_{isz} \tag{1}$$

Here y_{isz0} is the outcome of interest for student i in school s, measured at baseline. The term δ_z denotes the fixed effect for the school randomization strata, which is based on school geographic location, school size (total enrollment), and public/private status. TREAT_{is} and SPILL_{is} are indicators for a student being assigned or not assigned to the mentoring program in the treatment schools, and ε_{isz} is an idiosyncratic error term. The omitted category is students in the control schools, thus β_1 and β_2 identify the difference in baseline characteristics between treatment and

[20] Students also hold similar misperceptions about the outcomes of university and high school graduates (see Appendix Figures A5 and A6).

spillover students, respectively, relative to the pure control students.

We also test for baseline differences between treatment and spillover groups within treatment schools with the following specification:

$$y_{is0} = \mu_0 + \mu_1 \text{TREAT}_{is} + \delta_s + \varepsilon_{is} \tag{2}$$

where δ_s represents the school fixed effect. All other terms are as above.

Standard errors are clustered at the level of randomization: school level for equation (1) and student level for equation (2).

Table 3 presents baseline balance across treatment, control, and spillover groups for the Grade 10 sample, covering a broad range of demographic characteristics, primary outcomes, and intermediate outcomes. Of the 27 variables considered, 26 show no statistically significant differences between the treatment and control groups. Demographic indicators such as age, gender, and parental education are well balanced, with p-values above conventional significance thresholds. This pattern holds across cognitive and personality indices, including subjective performance in math and overall ability, the Big Five traits, baseline interest in science and math, and other pre-treatment outcomes. Differences between spillover and control groups (Columns 5-6), as well as between treatment and spillover groups (Columns 7-8), are similarly minimal.

If anything, students in the treatment group tend to perceive themselves as slightly weaker in science-related subjects at baseline. The subjective performance index in science subjects is significantly lower for treated students relative to both control and spillover groups (0.10-0.15 standard deviations, p-values < 0.05). Since the mentoring program is designed to influence science-track choices and performance, this initial disadvantage may make it harder to detect positive treatment impacts.

Balance results for the Grade 12 sample are shown in Table 4. Out of 26 pre-treatment variables, only one demonstrates a statistically significant difference at the 5% level when comparing the treatment and control groups: students' perceived ability to enroll in and complete TVET.

Specifically, students in the treatment group report significantly lower confidence (by 0.14 standard deviations) in their ability to pursue and succeed in vocational education compared to control group students. This imbalance is particularly noteworthy, given that a key objective of the program is to encourage TVET and strengthen students' preferences for and decisions to pursue vocational education. The lower baseline perception of ability among treated students could attenuate observed treatment effects, as these students begin from a relatively disadvantaged position. In other words, the program may face greater challenges in altering beliefs among students who initially perceive themselves as less capable, making it more difficult to detect statistically significant improvements. As a result, this suggests that any positive treatment effects identified in the analysis are likely to be lower-bound estimates of the program's true impact.

Comparisons involving the spillover group, relative to both the control (Columns 5–6) and treatment groups (Columns 7–8), reveal no additional imbalances of concern. Across a wide range of demographic, personality, interest, and belief-based variables, baseline characteristics remain balanced. These findings reinforce the validity of the randomized design and support the interpretation that any post-treatment differences can be reasonably attributed to the intervention, rather than to pre-existing differences in observable traits.

To address any residual imbalances, we include baseline covariates in all main regressions. We also note that several variables exhibit considerable rates of missing data across both samples. Non-response was common for questions on beliefs about approval, peer preferences, and self-assessed ability to pursue specific educational tracks. These patterns may reflect uncertainty or a lack of information and confidence in forming expectations. To verify that our results are not driven by differential missingness across groups, we conducted balance checks on non-response rates for all demographic, primary, and intermediate variables (Appendix B). In the Grade 12 sample, where belief measures are central to the intervention, we find no significant differences in missingness between treatment and control groups. In the Grade 10 sample, treated students are slightly more likely to report interests in math and science and expectations about the science stream, though these differences are small and arise in the context of already high response rates.

Overall, missingness appears largely balanced and is unlikely to bias the interpretation of treatment effects.

In the main analysis, we impute missing baseline covariates using the median and include missingness indicators in all regressions to retain sample size. All index measures are constructed using non-imputed data only.

Compliance. Among 1000 Grade 10 treatment students, 957 participated in at least one mentoring session, and 946 completed all four meetings, resulting in a compliance rate of 94.6%. In contrast, due to the low perception of TVET, only 454 Grade 12 treatment students attended all four meetings (64.8%). Given the issue of non-compliance, we employ an intent-to-treat approach, treating all students assigned to the mentoring program as part of the treatment group, regardless of their actual participation. We also report local average treatment effect where treatment assignment is used as an instrumental variable for their actual treatment status.

Attrition. We had low levels of attrition. For the STEM sample, 6189 of 6458 baseline students (95.8%) completed the first follow-up survey. In the treatment group, 963 of 1000 baseline students (96.3%) were surveyed, and in the spillover group, 2308 of 2443 (94.5%). As for the TVET sample, 5433 of 5540 baseline students (98%) completed the first follow-up survey. In the treatment group, 685 of 700 baseline students (97.9% %) were surveyed, and in the spillover group, 2125 of 2171 (97.9%). For the second follow-up survey targeting the TVET sample, despite our substantial efforts in contacting this group of students, frequent changes in phone numbers and limited access to other forms of communication, such as personal email, made this especially challenging. As a result, only 4742 out of 5540 baseline students (85.6%) completed this survey. As for administrative data, we were able to locate almost all our study subjects in the administrative test score records–specifically, 97% of the 10th grade students at baseline and 98% of the 12th grade students at baseline. However, because not all TVET institutes consistently reported to the MIS-TVET system, we cannot precisely assess attrition for TVET application and enrollment outcomes. We provide detailed attrition analysis in Appendix C.

First, we find no significant differences in the probability of attrition between the treatment and control groups for either sample. However, there is a 2 percentage point difference between spillover and control students in the first follow-up survey among the Grade 10 sample, which is significant at the 10% level (Table C1). Second, we observe some differences in baseline outcomes between attrition and non-attrition students, particularly in the Grade 10 sample (Table C2), but little evidence of such differences in the Grade 12 sample (Table C3). Finally, when regressing baseline outcome variables on treatment and spillover dummies for the attrition sub-sample, we find no significant differences in the Grade 10 sample, except for a marginal difference in beliefs about peer preferences between treatment and control attrition students at the 10% level (Table C4). In the Grade 12 attrition sample, we observe some differences in approval index and beliefs about future labor market outcomes with a TVET degree between treatment and control students (Table C5). After adjusting for attrition using (Lee 2009)'s bounds for the primary outcome variables, we observe minimal differences between the upper and lower bounds of the treatment effects (Table C6). This suggests that attrition is unlikely to have biased the results reported below.

4.2 Empirical Analysis

We capture the impact of the mentoring program by estimating the following specification

$$y_{isz} = \beta_0 + \beta_1 \text{TREAT}_{is} + \beta_2 \text{SPILL}_{is} + \delta_z + \gamma X_{is} + \theta y_{isz0} + \varepsilon_{isz} \tag{3}$$

Here y_{isz} is the outcome of interest for student i in school s, measured at the follow-up surveys or from the administrative database. To improve statistical power, we control for the baseline level of the outcome variable y_{isz0} when available, following McKenzie (2012), as well as other student characteristics including gender, household socioeconomic status, perceived academic performance, and the share of potential mentees among the target group of students in school s. Other terms are defined as in equation (1). The coefficient β_1 represents the intent-to-treat impact of the mentoring program, whereas β_2 represents the spillover effects from the participants to non-participants within the same treatment schools.

When there is no evidence of spillover affects, we improve the statistical power by estimating the within-school effects of the program. In particular, we compare the students who were assigned to the mentoring program (that is, treatment students) with those who were not (spillover students) within each treatment school by estimating the following equation:

$$y_{is} = \mu_0 + \mu_1 \text{TREAT}_{is} + \gamma X_{is} + \theta y_{is0} + \delta_s + \varepsilon_{is} \tag{4}$$

Standard errors are clustered at the level of randomization: school level for equation (3) and student level for equation (4). To address the issue of statistical inference with the small number of clusters in the TVET mentoring program analysis, we use the wild-cluster bootstrapped standard errors (Cameron, Gelbach, and Miller 2008). When estimating equation (3), we report the p-values computed using the wild-bootstrap cluster procedure, in addition to school-level clustered standard errors.

Given the large number of outcome variables in our study, false positives are a potential concern. To address this, in addition to using index variables previously discussed, we control for Type I errors by calculating the Romano-Wolf adjusted p-values for the treatment and spillover coefficients on the primary outcomes and key indexes of intermediate outcomes. This approach controls the FWER across the set of outcome variables while allowing for dependence among p-values by bootstrap resampling (Romano and Wolf 2005a,b).[21]

5 Empirical Results

5.1 Stated Preferences and Actual Decisions

Table 5 presents the regression results obtained from estimating equation (3), using stated preferences and actual decisions as dependent variables. In all regressions, we control for the baseline value of the outcomes if available, and the baseline covariates specified above. Our findings show statistically significant and meaningful impacts of STEM and TVET mentoring programs on stu-

[21] We implement this in Stata using a package written by Clarke, Romano, and Wolf (2020).

dents' interest in their respective fields of study.

For Grade 10 students, the likelihood of treatment students selecting science as their first educational preference increases by nearly 16 percentage points relative to a control group mean of 44%, representing a 36% increase. This effect is statistically significant at the 1% level, with standard errors clustered at the school level and corrections applied for multiple hypothesis testing. The increased preference for the science stream is accompanied by a lower preference for other general education streams, including arts (9.7 percentage point decrease) and commerce (3.7 percentage point decrease), as well as for vocational training (1.4 percentage point decrease). In addition, we find a smaller but statistically significant effect for non-treated students in treatment schools: spillover students are 4.1 percentage points more likely to choose science as their top field of study after Grade 10 compared to control students and a large part of this effect is due to students who are less likely to choose the arts stream as their preferred educational path (Table A4).

For 12th-grade students, we continue to observe significant effects of the mentoring program on students' stated preferences. Relative to a control group mean of 19%, treatment students are roughly 6 percentage points more likely to rank TVET among their top three educational choices based on genuine interest–a 32% increase. Similarly, treatment students are 4.0 percentage point more likely to state TVET as their top three educational choices if they were to decide at the time of the first follow-up survey. We do not find any statistically differential effects on preferences between treatment and spillover students.

While the mentoring programs significantly influenced students' preferences, there is no evidence that they affected students' final decisions. To examine this, we use an indicator capturing whether a baseline Grade 10 student subsequently enrolled in the science stream in Grade 11, based on administrative enrollment records. For the Grade 12 sample, we draw on data from the second follow-up survey as well as enrollment records from TVET institutions. As noted earlier, the administrative data on TVET applications is incomplete; therefore, the results presented in Appendix Table A6 should be interpreted with caution. Across all outcomes related to students' final decisions, the estimated coefficients are small and not statistically significant.

Local Average Treatment Effects. Since not all students assigned to the treatment group actually participated in the program, it is important to ask whether our intention-to-treat (ITT) effects differ from the actual treatment effects. We report the local average treatment effects (LATE) in Table A8, focusing on the across-school comparisons. We use the initial assignment of the mentoring program to students as an instrumental variable for their actual full participation in the program. Data on actual treatment comes from the mentor reports. To summarize, we find qualitatively similar effects when comparing the LATE effect with the ITT effect of the mentoring programs. The magnitudes are similar for Grade 10 students but are expectedly larger for Grade 12 students due to low take-up rates. However, we find no significant evidence for students' educational decisions.

5.2 Intermediate Outcomes

So far, we have established that the mentoring programs significantly affect students' stated preferences but do not influence their actual decisions. In this section, we analyze the intermediate outcomes to examine the mechanisms underlying these findings.

Grade 10 sample. We find statistically significant and meaningful effects of mentoring on most of the intermediate outcomes for Grade 10 students measured by our indexes. These include their preferences for STEM-related college majors after graduating from Grade 12; attitudes toward science and technology; knowledge of the field of study; approval from parents, friends, and society; peer preferences; expected satisfaction; and subjective assessment of one's ability to study the science stream (Table 6). Overall, the joint significance of the treatment effects on the intermediate outcomes (Column 3), obtained by estimating a system of equations jointly using seemingly unrelated regression, has a p-value of less than 0.01.

Students in the treatment group are 6.4 percentage points more likely to select STEM-related college majors as their top 2 preferences after Grade 12, compared to the control group, which has a mean of 79%. Additionally, attitudes toward science and technology are significantly more positive in the treatment group than in the control group after the mentoring program (0.083 standard deviation). Treatment students are more likely to agree with the statements: "Science makes lives healthier" and "Science makes the world better off." This effect is statistically significant at the 5% level when standard errors are clustered at the school level and at the 1% level when accounting for multiple hypothesis testing.

We also observe a significant increase in students' perceived knowledge of the science stream admissions procedure and career path (0.26 standard deviation), with this effect significant at the 1% level under both inference approaches. Treatment students report greater satisfaction with the science stream (0.23 standard deviation). They are more likely to feel recognized by their parents, friends, and society for pursuing science (0.15 standard deviation, p-value < 0.01) and to believe that their peers also prefer science as an educational path (0.11 standard deviation, p-value < 0.05). Furthermore, treatment students show a 0.11 standard deviation increase in confidence about their ability to enroll in and succeed within the science stream, and a 0.16 standard deviation decrease in their bias against women in STEM fields. All of these effects are significant at the 1% level.

On the other hand, we find little evidence of an improvement in their objective knowledge of admissions eligibility and procedures. The positive but statistically insignificant and small point estimate for objective knowledge may be due to the fact that admissions procedures can change from year to year, and our questions did not account for these variations.

Applying to the science stream typically requires stronger academic performance than other tracks, such as arts or commerce. The lack of impact on actual enrollment may be due to students being insufficiently prepared to meet these more demanding entry requirements. To explore this possibility, we examine whether the mentoring program influences students' interest in science subjects and their academic effort, as indicated by their BCSE passing rates and science scores on the national graduation exam. As discussed in Section 2, these two measures serve as complementary proxies for student effort: passing rates capture both continuous assessment–based on class attendance and study attitude, as reported by teachers–and performance on the national exams.

We find strong evidence that the mentoring program positively influenced Grade 10 students' interest in science subjects (Table 6). Students in the treatment group report a 0.12 standard deviation increase in science interest, significant at the 1% level. There is also suggestive evidence of improvements in test scores and graduation outcomes (Table 6 and Appendix Table A5), though these effects do not reach conventional significance levels when estimated across schools. However, within treatment schools, comparing treatment and spillover students reveals a significant increase in graduation exam success: treatment students are 4.4 percentage points more likely to earn a BCSE Pass Certificate, relative to a 73% pass rate among spillover peers. Taken together, these findings suggest the light-touch intervention fostered stronger interests in science and may have improved academic effort.

Grade 12 sample. Table 7 presents the findings on intermediate outcomes for the Grade 12 baseline sample. In contrast to the Grade 10 sample, we find little evidence of program impact. Across 11 intermediate outcomes, only two show significant effects: perceived and objective knowledge of the TVET system. The joint significance of the treatment effects on the intermediate outcomes (Column 3) from estimating a seemingly unrelated regression has a p-value of less than 0.01.

Treatment students report a 0.19 standard deviation increase in their perceived knowledge of the TVET system compared to the control group (p-value < 0.05). They are also 0.1 standard deviations more likely to correctly answer questions on TVET application eligibility, admission procedures, and interview criteria, with this effect significant at the 10% level. When analyzing each element of this objective knowledge index, we see a large improvement in the treatment students' understanding of the application eligibility and entry criteria for this field of study (both significant at the 5% level), but no evidence for the admissions procedure (Table A7).

Although we do not observe significant impacts on other intermediate outcomes, the estimated coefficients are in the expected direction. For instance, the coefficients on biases are all negative, indicating that treatment students are somewhat less biased against women in TVET and blue-collar jobs. Similarly, students' attitudes toward science and technology, expected satisfaction with TVET, and beliefs about peers' preferences for TVET all show positive changes.

5.3 Heterogeneity Analysis

Following the pre-analysis plans, we conduct heterogeneity analysis on primary outcomes across multiple dimensions, including the gender of mentors and mentees, as well as other students' baseline characteristics.

Mentor and Mentee Gender Pairs. The randomization nature of the matching process between mentors and mentees allows us to investigate the impact of gender on mentoring. We estimate the following equation:

$$y_{isz} = \delta_z + \alpha_0 + \sum_{j=1}^{4} \alpha_j \text{TREAT}_{is} \times \mathbf{I}\{G_j\} + \beta_2 \text{SPILL}_{is} + X_{is}\gamma + \theta y_{isz0} + \epsilon_{isz} \tag{5}$$

where $\mathbf{I}\{G_j\}$ is an indicator that takes the value of one if student i belongs to the male mentor-male mentee group, male mentor-female mentee group, female mentor-male mentee group, and female mentor-female mentee group, and zero otherwise. All other terms are the same as in equation (3). The coefficient α_j represents the effects of the mentoring program participation on students of specific mentor-mentee gender pair j, relative to the pure control.

In practice, however, we have observed significant differences in several baseline characteristics between each mentor-mentee group and the control group (see Appendix Tables A9 and A10). Specifically, 10th-grade female (male) mentees exhibit, on average, less (more) bias against women in STEM compared to the control group at baseline. Grade 10 female mentees demonstrate a lower preference for math and science subjects compared to the control group, while male mentees express a stronger preference for studying math. Grade 12 female mentees likewise express less preference for the TVET system. In addition, an important caveat to the analysis by the mentor-mentee gender group is the low statistical power to disentangle differential effects across gender pairs. Therefore, the following results should be interpreted with caution, and null effects should not be over-interpreted.

We present the results in Appendix Table A11. We find little evidence of gender-based differences in the impact of mentorship pairings. In the Grade 10 sample, the effect for male students does not significantly differ between male and female mentors, as shown by the p-values comparing columns (3) and (5). Similarly, for female students, there is no significant difference in effects between male and female mentors, as indicated by the p-values for the differences between columns (4) and (6). However, a trend emerges in the point estimates, suggesting that male mentees may be more responsive than female mentees in adjusting their preferences and actual choices regarding the science stream. Specifically, male-male mentoring increases the likelihood of selecting science as the first choice by 21.6 percentage points, compared to a 13.2 percentage point increase for male-female pairs (with a p-value of 0.078 for the difference). For 12th graders, there is little evidence of differential effects across pairing on these outcomes.

In addition, although not specified in the pre-analysis plan, we perform an exploratory analysis motivated by prior educational and psychological literature on the potential role of mentor–mentee gender concordance.[22] Specifically, we compare results for students paired with mentors of the same gender versus those paired with mentors of a different gender. As reported in Appendix Table A14, we find no systematic differences in outcomes based on gender match. The only statistically significant finding appears among Grade 12 students, where those in cross-gender mentor pairs report a greater preference for TVET relative to those in same-gender pairs (p-value < 0.05). Overall, these results suggest that gender match does not play a meaningful moderating role in the impact of the intervention.

Baseline Academic Performance and Subject Preference. The mentoring program is designed to give students a deeper understanding of the experiences of individuals in science and STEM fields by sharing relevant insights and experiences. We anticipate that the program's effects will vary across students, depending on their initial academic performance and interest in science-related subjects. In this analysis, we estimate a variation of equation (5), where $\mathbf{I}\{G_j\}$ is an indicator variable equal to one if student i's perceived performance or interest in science subjects at baseline places them in the bottom 75%, and zero otherwise. The results in Appendix Table

[22]For example, see Kanchewa, Rhodes, Schwartz, and Olsho (2014) and references cited therein for further discussion.

A15 show that the significant impact of the mentoring program on stated preferences is primarily driven by students who initially perceived themselves as having lower academic performance or less interest in science. In contrast, actual decisions exhibit positive effects for those with higher academic capability or more interested in studying science subjects, though the magnitude is small and not statistically significant.

We interpret these findings as suggestive that students who perceive themselves as having low academic performance and little interest in science may initially feel disconnected from STEM fields. However, through exposure to the experiences of students in STEM, they may gain a better understanding of these fields and realize that success is not solely dependent on innate ability but also on persistence and support. This new perspective could increase their interest in science, making it feel like a more attainable path. On the other hand, students who already have a strong interest in science are less likely to experience such a shift, as they are already motivated and familiar with the subject matter.

Baseline Bias Against Blue-Collar Jobs and Approval Beliefs. We hypothesize that the limited impact on actual decisions among Grade 12 students may stem from persistent biases against blue-collar jobs and a lack of parental support. To explore this, we estimate a variation of equation (5), where $\mathbf{I}\{G_j\}$ is an indicator variable equal to one if student i's baseline bias and approval index falls in the bottom 50%, and zero otherwise. The results presented in Appendix Table A16 suggest that the effects on stated preferences are more pronounced for students whose baseline bias against blue-collar jobs is below the median and for those who perceive higher parental approval for enrolling in TVET programs. However, these differences do not translate into significant variations in actual decisions across these groups. Nonetheless, suggestive evidence from the second follow-up survey indicates that students with lower parental approval are less likely to apply to and gain admission to TVET programs (p-values of the difference in impacts with students with higher parental approval are 0.095 and 0.015, respectively).

5.4 Discussion

This section interprets the findings presented so far, exploring why the mentoring program influenced student preferences but had limited effects on actual enrollment. We examine structural, psychological, and contextual factors that shaped program outcomes and identify lessons for future interventions.

We found that the mentoring program significantly boosted Grade 10 students' interest in the science stream and Grade 12 students' interest in TVET, with increases of over 30% relative to the control group. Among 10th-grade students, these shifts were accompanied by more favorable attitudes toward science and technology, greater perceived support from parents and peers, and stronger beliefs that classmates would pursue similar pathways. For 12th-grade students, increased interest in TVET appeared linked to improved understanding of admission criteria, training requirements, and the realities of vocational careers. These results highlight the importance of non-pecuniary factors–such as beliefs, perceptions, and social norms–in shaping educational preferences, in line with evidence from other contexts (e.g., Delavande and Zafar 2019).

Yet despite these encouraging shifts in attitudes and aspirations, the interventions did not produce significant impacts on actual enrollment–either in the science stream (Grade 10) or TVET programs (Grade 12). This disconnect between intention and action can be better understood by examining a range of structural and contextual barriers that constrained students' ability to follow through on their interests.

Academic Rigor, Resource Constraints, and Science Enrollment. The science stream in Bhutan is highly prestigious but constrained by strict admission criteria and limited capacity. These structural barriers often prevent even motivated students from qualifying. The mentoring program sought to bridge the gap between aspiration and achievement by encouraging students to take science more seriously, set higher goals, and prepare more effectively.

While there were encouraging signs of increased academic effort among treated students–such as higher BCSE pass rates–no statistically significant gains were observed in core test scores like math and science. This may be because standardized exams are influenced not only by test-day performance but also by longer-term academic preparation. School-based assessments such as attendance and teacher evaluations, which may be more sensitive to motivational shifts, are not captured in test score data.

These findings suggest that the program succeeded in raising aspirations but fell short in converting that motivation into measurable academic outcomes. Foundational learning gaps, resource limitations, and the disruptions of the COVID-19 pandemic likely compounded this challenge. Moreover, the short interval between the intervention and the final exams may have left students with insufficient time to adopt new study strategies or recover from earlier learning losses. In highly competitive fields like science, sustained preparation from earlier grades is often necessary for success; a late surge in motivation may be too little, too late.

Qualitative reports from mentors and mentees reinforce this interpretation. Students frequently referenced terms like “doubt,” “stress,” and “marks,” pointing to the academic and emotional pressures they faced. These insights underscore the need to address not only informational gaps but also structural and psychological barriers to success. Future interventions may need to be introduced earlier in the school year to give students time to respond meaningfully to new goals and expectations.

Even when students are motivated and academically prepared, supply-side constraints can still limit access. STEM program capacity in Bhutan is restricted by shortages of specialized facilities, laboratory equipment, and qualified teachers. Despite strong student interest and social recognition, these systemic bottlenecks make it difficult to expand enrollment. This highlights the importance of aligning student-facing interventions with broader investments in instructional capacity and infrastructure.

Social Stigma, Family Dynamics, and the Limits of Student-Only Interventions. In contrast to STEM, vocational education in Bhutan faces stigma. TVET is often perceived as less prestigious and linked to lower-status employment. This social bias may have contributed to relatively low participation in the TVET mentoring program, with only 65% of assigned students completing all four sessions. Parental support also appears more limited for TVET. While mentoring improved students' perceptions of parental approval for STEM, no such shift occurred among 12th-grade students considering vocational pathways.

These findings are consistent with broader evidence from low- and middle-income countries, where TVET is under-enrolled due to entrenched social hierarchies and weak parental endorsement (UNESCO 2021; UNESCO, World Bank and ILO 2023). Qualitative analysis of mentor-mentee reflections supports this view. Although students rarely mentioned stigma directly, discussions often focused on the legitimacy and structure of the TVET system, using terms like "certificate," "system," and "skillful" (Appendix Figure A4). This defensive framing suggests that students may view TVET as a practical but socially risky choice.

The absence of aspirational or emotional language–unlike the more enthusiastic discussions about STEM–reflects a guarded stance toward vocational education. Given that 57% of Grade 10 and 62% of Grade 12 students report discussing academic decisions with parents (Tables 1-2), family dynamics likely play a pivotal role. Mentoring can shift student attitudes, but without broader support from parents and communities, these changes may not translate into action.

To improve the cost-effectiveness and scalability of mentoring-based TVET promotion, a more targeted approach may be beneficial. Identifying youth who already show interest in vocational pathways and offering them tailored mentoring could enhance program outcomes. Complementary behavioral nudges and well-designed information campaigns can further support student engagement. Community outreach–particularly involving parents and local leaders–may help counter stigma and increase participation (UNESCO-UNEVOC 2019). By focusing resources on those most likely to benefit, and addressing both informational and social constraints, policymakers can enhance the overall impact and feasibility of scaling such interventions-especially in contexts where interest in TVET remains low.

Pandemic Disruptions and Shifting Opportunity Structures. Between 2020 and 2022, Bhutan's education system faced significant disruptions due to the COVID-19 pandemic. School closures, remote learning, and delayed exams affected all students–but disproportionately harmed those in rural and low-income settings with limited access to digital resources. These challenges were especially acute for Grade 12 students attending boarding schools, many of whom faced further closures during their final term.

The Ministry of Education implemented online instruction and containment policies, but logistical barriers–such as movement restrictions and lack of internet–undermined their effectiveness. These disruptions likely increased students' uncertainty around academic progression, career planning, and post-secondary options.

At the same time, the mentoring program may have resonated more deeply with students who were anxious about their futures. The program's focus on career pathways provided a sense of direction during a period of widespread disruption. Yet the pandemic also complicated implementation. Some sessions were moved online, reducing engagement, and logistical issues affected mentor availability and student participation.

Moreover, the pandemic altered labor market prospects, introducing new uncertainties that may have shaped students' perceptions of the program's value. While it is difficult to disentangle the effects of the pandemic from those of the intervention, it is clear that these events significantly influenced how students received and responded to the program.

It is also possible that some Grade 12 mentees will apply to TVET institutions–such as the TTIs or IZC–after the study's follow-up period. Their decisions may be shaped by longer-term factors, including economic recovery, labor market trends, and evolving family attitudes. These extended timelines suggest that part of the program's impact may manifest later, beyond our current measurement window.

Finally, the mentoring delivery model has important implications for scalability. In the current approach, university students and TVET trainees served as mentors, with per-mentee costs–including mentor honoraria, travel, and internet reimbursements–averaging Nu 1,750–1,900 (approximately USD 23–25).[23] While relatively low-cost in the short term, this model may not be financially sustainable at scale. Starting in 2025, all Bhutanese secondary schools are expected to

[23] A detailed breakdown of the cost is provided in Appendix Table A17.

have at least one designated school counselor, presenting a promising alternative. Training these counselors to deliver the mentoring content could offer a more viable and sustainable solution. Embedding mentoring within the existing education workforce may reduce costs, strengthen institutional ownership, and support long-term integration.

6 Conclusion

Mentoring interventions have shown promise in shaping students' educational and career trajectories by influencing aspirations, self-beliefs, and access to information. Yet most existing research comes from high-income countries or targets older, postsecondary populations. Less is known about how mentoring can support younger students in low-income contexts–particularly those considering stigmatized or poorly understood pathways like TVET.

This study addresses that gap through two field experiments in Bhutan: one targeting Grade 10 students exploring STEM options, and another introducing Grade 12 students to vocational training. We find that mentoring significantly shifted students' preferences, increasing interest in both STEM and TVET despite substantial cultural and societal barriers. In the STEM program, these changes were accompanied by improved attitudes toward science, stronger perceptions of social support, and clearer understanding of available opportunities. These results reinforce the importance of non-financial factors–such as beliefs, perceptions, and norms–in shaping educational choices (Delavande and Zafar 2019).

However, the interventions had limited effects on actual enrollment. For science, systemic barriers–including strict entry requirements and constrained capacity– likely restricted students' ability to act on new aspirations. For TVET, gains in student interest were muted by stigma and weak parental support. These outcomes illustrate the limitations of student-only interventions when key decisions are influenced by family and community norms.

The importance of these dynamics is underscored by recent policy shifts in Bhutan. In January 2023, the Royal University of Bhutan eliminated several arts and humanities programs in favor of degrees aligned with labor market demands, such as data science and analytics.[24] While such reforms aim to improve employability, they may inadvertently create confusion or disengagement if students are unprepared or lack guidance.

Mentoring programs can play a critical role in helping students interpret and adapt to these changes. By providing timely, locally relevant support, mentoring can reduce informational barriers and foster more informed decision-making. But for such programs to translate into lasting outcomes, they must go beyond students to engage families, educators, and communities–particularly in contexts where skepticism toward non-traditional pathways remains high. Our findings demonstrate that even in resource-constrained settings like Bhutan, mentoring can shift student aspirations, leading to increased interest in STEM and TVET pathways.

Yet, while these shifts in interests are promising, they are insufficient for driving lasting behavioral change on their own. Stigma toward TVET, coupled with weak parental support, remains a significant barrier. Similarly, in STEM fields, aspirations need to be matched with adequate academic preparation, access to quality education, and resources like science labs. These challenges are not unique to Bhutan; students across low- and middle-income countries face similar structural and social frictions when pursuing non-traditional or demanding educational pathways.

Our study, with consistent results across two large-scale experiments, underscores the external validity of mentoring as an effective policy tool in such contexts. But these findings also highlight a critical insight: policy reforms alone may not be sufficient to shift student behavior or aspirations. Complementary support–through targeted mentoring, career guidance, and community engagement–is essential to help students navigate complex educational landscapes. As Bhutan and other low-income countries restructure their postsecondary systems, embedding such supports into existing infrastructure will be key to ensuring that reforms are inclusive, understood, and equitably adopted. This approach can better align student aspirations with the pathways available to them and support more equitable access to opportunity.

[24] https://thebhutanese.bt/more-than-6000-arts-students-wonder-what-to-do-after-rub-axes-arts-courses-from-govt-colleges/

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Tables and Figures

Tables

Table 1: Summary statistics, Grade 10 sample

	Mean	SD	N
Age	16.76	1.32	6,458
Male	0.45	0.50	6,458
Father with high school diploma (dummy)	0.20	0.40	5,878
Mother with high school diploma (dummy)	0.12	0.33	6,105
Science as top 1 choice after grade 10 (dummy)	0.37	0.48	6,458
STEM-related college majors as top 2 choice after grade 12 (dummy)	0.74	0.44	6,458
Beliefs about approval of parents, friends and society (5-point Likert)	3.91	0.83	6,397
Attitude toward science and technology (5-point Likert)	3.98	0.85	6,442
Bias against women in STEM (5-point Likert)	2.22	0.81	6,451
Discuss with parents about career choice (dummy)	0.57	0.49	6,458
Discuss with friends about career choice (dummy)	0.50	0.50	6,458
Discuss with teachers about career choice (dummy)	0.15	0.36	6,458

Table 2: Summary statistics, Grade 12 sample

	Mean	SD	N
Age	18.88	1.43	5,540
Male	0.43	0.50	5,540
Father with high school diploma (dummy)	0.21	0.41	4,874
Mother with high school diploma (dummy)	0.05	0.21	5,527
TVET as top 1 choice after grade 12 genuine interest (dummy)	0.03	0.17	5,540
TVET as top 3 choice after grade 12 genuine interest (dummy)	0.21	0.41	5,540
TVET as top 3 choice after grade 12 if decide today (dummy)	0.03	0.16	5,540
TVET as top 3 choice after grade 12 if decide today (dummy)	0.18	0.38	5,540
Beliefs about approval of parents, friends and society (percent)	50.28	20.98	4,708
Attitude toward science and technology (5-point Likert)	4.11	0.87	5,515
Bias against women in STEM (5-point Likert)	2.30	1.12	5,161
Bias against blue-collar jobs (5-point Likert)	3.28	0.80	5,303
Discuss with parents about career choice (dummy)	0.62	0.48	5,540
Discuss with friends about career choice (dummy)	0.42	0.49	5,540
Discuss with teachers about career choice (dummy)	0.11	0.32	5,540

Table 3: Baseline balance, Grade 10 sample

	Obs.	Control	Treat - Control		Spill - Control		Treat - Spill	
			Mean	p-value	Mean	p-value	Mean	p-value
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Panel A: Demographics								
Age	6458	16.73	-0.01	0.89	0.02	0.82	-0.05	0.37
Male	6458	0.46	-0.00	0.99	-0.02	0.12	0.02	0.33
Father with high school diploma (dummy)	5878	0.21	-0.01	0.82	-0.01	0.79	0.01	0.75
Mother with high school diploma (dummy)	6105	0.14	-0.01	0.40	-0.03	0.22	0.02	0.24
Wealth index (PCA)	5492	-0.00	-0.03	0.72	-0.03	0.70	0.02	0.60
Subjective performance index: math	6395	0.00	-0.03	0.65	0.06	0.42	-0.02	0.54
Subjective performance index: science subjects	6416	-0.00	-0.15	0.01	-0.07	0.18	-0.10	0.02
Subjective performance index: non-science subjects	6424	-0.00	-0.03	0.70	-0.04	0.57	-0.08	0.05
Subjective performance index: overall	6002	0.00	-0.00	0.97	-0.01	0.91	-0.01	0.78
Potential share of mentees	6458	0.28	0.00	0.25	0.00	0.39	0.00	.
Big 5 extroversion index	6430	0.00	0.04	0.47	0.02	0.62	0.02	0.59
Big 5 agreeness index	6424	-0.00	-0.00	0.95	0.03	0.34	-0.04	0.31
Big 5 conscientiousness index	6442	0.00	0.02	0.68	0.05	0.38	-0.05	0.25
Big 5 neuroticism index	6439	0.00	-0.06	0.07	-0.05	0.15	-0.02	0.56
Big 5 openness index	6427	0.00	0.03	0.55	-0.02	0.64	0.03	0.55
Panel B: Primary Outcomes								
Science as top 1 choice after grade 10 (dummy)	6458	0.38	-0.03	0.10	-0.02	0.35	-0.01	0.79
Panel C: Intermediate Outcomes								
STEM-related college majors as top 2 choice after grade 12 (dummy)	6458	0.74	-0.01	0.73	0.02	0.27	-0.01	0.44
Interest in math index	6430	-0.00	-0.01	0.87	0.01	0.90	0.03	0.43
Interest in science subjects index	6451	-0.00	-0.09	0.11	-0.00	0.99	-0.07	0.09
Interest in studying overall index	6116	-0.00	-0.01	0.81	0.01	0.78	-0.02	0.63
Attitude to science and technology index	6442	0.00	0.01	0.76	0.03	0.42	-0.01	0.85
Bias against women in STEM index	6451	0.00	-0.03	0.73	-0.04	0.57	0.01	0.90
Subjective knowledge on science stream index	6345	0.00	0.01	0.88	-0.04	0.39	0.08	0.07
Expected satisfaction on science stream index	6309	0.00	-0.05	0.32	-0.04	0.45	-0.03	0.43
Approval index if choosing science	6397	-0.00	0.02	0.64	-0.02	0.65	0.01	0.79
Belief index about peers' preference in science	6119	-0.00	-0.07	0.27	-0.04	0.47	-0.01	0.80
Subjective assessment to enroll and complete science stream index	6383	0.00	-0.05	0.34	-0.05	0.34	-0.04	0.35

Notes: This table examines differences in baseline values across key variables used in the main analysis. Column (1) shows the number of observations for each variable. Column (2) reports the mean of the control group. Columns (3) and (4) show the mean difference between the treatment and control groups, along with the corresponding p-values. Columns (5) and (6) present the same comparison between the spillover and control groups. These differences correspond to coefficients on TREAT and SPILL in across-school regressions (equation 3) including strata fixed effects and cluster-robust standard errors at the school level. Columns (7) and (8) display the mean difference and p-value between the treatment and spillover groups, estimated using within-school regressions with robust standard errors (equation 4).

Table 4: Baseline balance, Grade 12 sample

	Obs.	Control	Treat - Control		Spill - Control		Treat - Spill	
			Mean	p-value	Mean	p-value	Mean	p-value
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Panel A: Demographics								
Age	5540	18.81	0.06	0.73	0.11	0.55	0.08	0.19
Male	5540	0.42	0.01	0.58	0.02	0.15	-0.01	0.64
Father with high school diploma (dummy)	4874	0.22	-0.01	0.67	-0.01	0.78	-0.02	0.20
Mother with high school diploma (dummy)	5527	0.04	0.00	0.77	0.00	0.56	0.00	0.68
Wealth index (PCA)	4802	0.00	0.04	0.73	-0.04	0.75	0.03	0.49
Subjective performance index: english	5446	-0.00	0.09	0.41	0.04	0.74	0.00	0.98
Subjective performance index: dzongkha	5492	0.00	-0.00	0.97	0.07	0.43	-0.04	0.42
Subjective performance index: overall	5100	0.00	-0.04	0.68	0.00	0.96	-0.02	0.60
Potential share of mentees	5540	0.20	-0.00	0.51	-0.00	0.57	0.00	.
Big 5 extroversion index	5483	0.00	-0.00	0.99	-0.03	0.32	0.01	0.82
Big 5 agreeness index	5468	0.00	0.03	0.56	0.07	0.26	-0.02	0.73
Big 5 conscientiousness index	5478	-0.00	0.00	0.96	0.08	0.20	-0.05	0.28
Big 5 neuroticism index	5480	0.00	0.01	0.85	-0.06	0.20	0.05	0.23
Big 5 openness index	5464	0.00	-0.05	0.37	-0.02	0.60	-0.01	0.83
Panel B: Primary Outcomes								
TVET as top 3 choice after grade 12 genuine interest (dummy)	5540	0.20	-0.01	0.70	0.02	0.41	-0.03	0.15
TVET as top 3 choice after grade 12 if decide today (dummy)	5540	0.17	0.02	0.47	0.03	0.27	-0.01	0.61
Panel C: Intermediate Outcomes								
Bias against blue-collar jobs index	5303	0.00	0.03	0.59	0.04	0.46	0.00	0.98
Attitude to science and technology index	5515	-0.00	-0.05	0.29	-0.02	0.58	-0.02	0.68
Bias against women in TVET index	5161	0.00	0.08	0.23	0.06	0.23	-0.02	0.72
Subjective knowledge on TVET index	5415	0.00	-0.03	0.61	0.05	0.58	-0.04	0.33
Expected satisfaction on TVET index	5022	-0.00	0.01	0.91	-0.01	0.93	0.02	0.70
Approval index if choosing TVET	4708	-0.00	0.02	0.75	0.03	0.55	-0.02	0.73
Belief index about peers' preference in TVET	5185	0.00	-0.02	0.76	0.04	0.63	-0.02	0.71
Subjective assessment to enroll and complete TVET index	4988	0.00	-0.14	0.01	-0.06	0.19	-0.08	0.09
Belief on own employment (%) with TVET degree	4878	46.37	0.34	0.75	-0.81	0.36	1.02	0.32
Belief on own earnings (Nu 000) with TVET degree	5208	22.16	0.86	0.37	-0.22	0.72	1.29	0.05

Notes: Same as Table 3.

Table 5: The impacts of mentoring on stated preferences and actual decisions

	Obs.	Control Mean (SD)	Treatment Effects (s.e.)	Spillover Effects (s.e.)	Treatment vs. Spillover (s.e.)
	(1)	(2)	(3)	(4)	(5)
Grade 10 sample					
Science as top 1 choice after grade 10 (dummy)	6189	0.44	0.158***	0.041**	0.101***
		(0.50)	(0.021)	(0.015)	(0.018)
			[0.004]	[0.008]	[0.004]
Enrolled in science stream in grade 11 (dummy)	6458	0.28	-0.002	-0.002	-0.006
		(0.45)	(0.029)	(0.027)	(0.015)
			[0.984]	[1.000]	[0.996]
Grade 12 sample					
TVET as top 3 choice after grade 12 genuine interest (dummy)	5433	0.19	0.058***	0.040**	0.012
		(0.39)	(0.021)	(0.016)	(0.020)
			{0.019}	{0.042}	
			[0.008]	[0.004]	[1.000]
TVET as top 3 choice after grade 12 if decide today (dummy)	5433	0.16	0.040**	0.052***	-0.019
		(0.37)	(0.018)	(0.013)	(0.019)
			{0.036}	{0.004}	
			[0.036]	[0.004]	[0.996]
Survey: Application to TVET (dummy)	4739	0.07	-0.009	0.001	0.003
		(0.26)	(0.019)	(0.013)	(0.013)
			{0.705}	{0.966}	
			[0.996]	[0.996]	[1.000]
Survey: Admission to TVET (dummy)	4739	0.03	-0.007	-0.002	0.001
		(0.18)	(0.011)	(0.008)	(0.009)
			{0.587}	{0.819}	
			[0.996]	[0.924]	[1.000]

Notes: Column (1) shows the number of observations for each variable. Column (2) shows the control group's means and standard deviations. Columns (3)–(4) indicate mean differences with the control group, after controlling for strata-fixed effects, with cluster-robust standard errors at the school level in parentheses. Mean differences are coefficients on TREAT and SPILL in regressions of the variable on the left-hand side on TREAT and SPILL, controlling for baseline values of the outcome when available, baseline demographics, and strata fixed effects (equation 3). Column (5) presents the difference between the treatment and spillover groups, after controlling for baseline values of the outcome when available, baseline demographics, and school-fixed effects using the sample of treatment schools, with robust standard errors in parentheses (equation 4). Wild-cluster bootstrapped p-values are in braces, and Romano-Wolf stepdown adjusted p-values for multiple inference are reported in brackets. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Table 6: The impacts of mentoring on intermediate outcomes, Grade 10 sample

	Obs.	Control Mean (SD)	Treatment Effects (s.e.)	Spillover Effects (s.e.)	Treatment vs. Spillover (s.e.)
	(1)	(2)	(3)	(4)	(5)
STEM-related college majors as top 2 choice after grade 12 (dummy)	6189	0.79	0.064***	0.008	0.037**
		(0.41)	(0.016)	(0.015)	(0.016)
			[0.004]	[0.956]	[0.171]
Attitude to science and technology index	6162	0.00	0.083**	0.001	0.092**
		(1.00)	(0.039)	(0.041)	(0.044)
			[0.008]	[1.000]	[0.307]
Bias against women in STEM index	6147	-0.00	-0.158***	0.009	-0.138***
		(1.00)	(0.047)	(0.034)	(0.034)
			[0.004]	[0.996]	[0.004]
Subjective knowledge on science stream index	6139	0.00	0.262***	0.053	0.179***
		(1.00)	(0.045)	(0.040)	(0.041)
			[0.004]	[0.279]	[0.004]
Objective knowledge on science stream index	6183	-0.00	0.002	-0.003	0.010
		(1.00)	(0.050)	(0.035)	(0.042)
			[0.984]	[1.000]	[0.996]
Expected satisfaction on science stream index	6095	0.00	0.229***	0.049	0.145***
		(1.00)	(0.055)	(0.050)	(0.040)
			[0.004]	[0.590]	[0.004]
Approval index if choosing science	6122	0.00	0.152***	0.022	0.083**
		(1.00)	(0.042)	(0.033)	(0.038)
			[0.004]	[0.920]	[0.271]
Belief index about peers' preference in science	5965	0.00	0.113**	0.051	0.057
		(1.00)	(0.050)	(0.049)	(0.040)
			[0.008]	[0.570]	[0.721]
Subjective assessment to enroll and complete science stream index	6119	-0.00	0.107***	0.027	0.062
		(1.00)	(0.040)	(0.041)	(0.038)
			[0.004]	[0.920]	[0.586]
Interest in math index	6151	0.00	-0.017	-0.056	-0.004
		(1.00)	(0.036)	(0.035)	(0.033)
			[0.825]	[0.100]	[0.996]
Interest in science subjects index	6171	0.00	0.121***	0.002	0.096***
		(1.00)	(0.041)	(0.038)	(0.035)
			[0.004]	[1.000]	[0.092]
Interest in studying overall	6039	-0.00	0.051	0.011	0.020
		(1.00)	(0.045)	(0.041)	(0.042)
			[0.275]	[0.996]	[0.996]
Passed BCSE certificate (dummy)	6285	0.73	0.021	-0.007	0.044***
		(0.44)	(0.028)	(0.023)	(0.016)
			[0.558]	[0.996]	[0.096]

Notes: Same as Table 5.

Table 7: The impacts of mentoring on intermediate outcomes, Grade 12 sample

	Obs.	Control Mean (SD)	Treatment Effects (s.e.)	Spillover Effects (s.e.)	Treatment vs. Spillover (s.e.)
	(1)	(2)	(3)	(4)	(5)
Attitude to science and technology index	5421	0.00	0.017	-0.050	0.056
		(1.00)	(0.047)	(0.033)	(0.048)
			{0.748}	{0.202}	
			[0.996]	[0.199]	[0.984]
Bias against women in TVET index	5141	0.00	-0.051	-0.043	0.004
		(1.00)	(0.066)	(0.049)	(0.047)
			{0.480}	{0.462}	
			[0.968]	[0.701]	[1.000]
Bias against blue-collar jobs index	5274	-0.00	-0.028	-0.019	0.009
		(1.00)	(0.048)	(0.040)	(0.047)
			{0.619}	{0.686}	
			[0.996]	[0.849]	[1.000]
Subjective knowledge on TVET index	5363	0.00	0.186***	-0.028	0.208***
		(1.00)	(0.067)	(0.053)	(0.040)
			{0.012}	{0.637}	
			[0.008]	[0.849]	[0.004]
Objective knowledge on TVET index	5422	0.00	0.100*	-0.022	0.118**
		(1.00)	(0.051)	(0.034)	(0.046)
			{0.083}	{0.571}	
			[0.076]	[0.849]	[0.195]
Expected satisfaction on TVET index	5043	-0.00	0.034	-0.029	0.027
		(1.00)	(0.072)	(0.047)	(0.045)
			{0.687}	{0.613}	
			[0.996]	[0.849]	[1.000]
Approval index if choosing TVET	4672	-0.00	-0.022	-0.044	-0.009
		(1.00)	(0.044)	(0.051)	(0.050)
			{0.664}	{0.542}	
			[0.996]	[0.701]	[1.000]
Belief index about peers' preference in TVET	5158	0.00	0.028	-0.004	0.023
		(1.00)	(0.053)	(0.057)	(0.039)
			{0.662}	{0.959}	
			[0.996]	[0.996]	[1.000]
Subjective assessment to enroll and complete TVET index	5074	-0.00	0.036	-0.101	0.116**
		(1.00)	(0.078)	(0.078)	(0.046)
			{0.716}	{0.398}	
			[0.996]	[0.283]	[0.195]
Belief on own employment (%) with TVET degree	4863	46.34	0.342	-1.327	1.124
		(21.16)	(0.852)	(0.841)	(1.049)
			{0.700}	{0.229}	
			[0.996]	[0.167]	[0.992]
Belief on own earnings (Nu 000) with TVET degree	5159	21.82	-0.289	-0.473	-0.005
		(13.35)	(0.517)	(0.402)	(0.637)
			{0.599}	{0.298}	
			[0.996]	[0.414]	[1.000]

Notes: Same as Table 5.

Figures

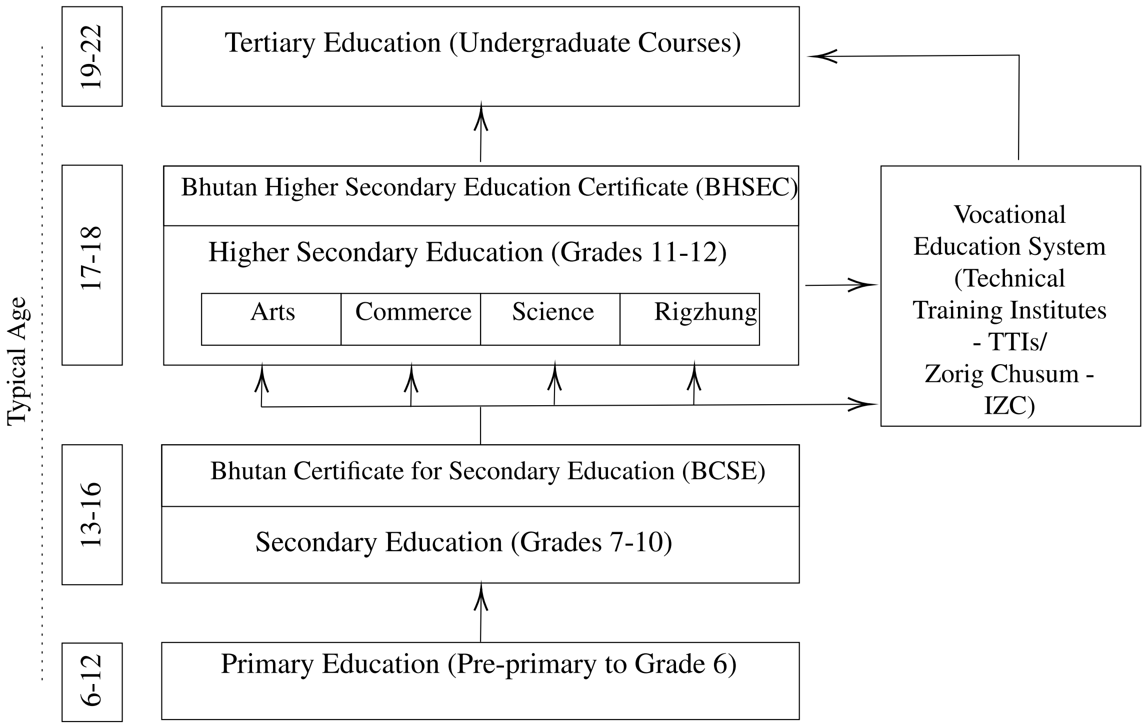

Figure 1: Education system in Bhutan

Notes: This figure illustrates Bhutan's education system. Primary education spans seven years, from pre-primary through Grade 6. Secondary education is divided into four levels, from Grade 7 to Grade 10. At the end of Grade 10, students take the Bhutan Certificate of Secondary Education (BCSE) examination. Enrollment in higher secondary school is based on their BCSE results. Students who do not qualify for public higher secondary schools may either attend private schools or pursue vocational education at technical training institutes (TTIs) or Zorig Chsum (IZC), which typically requires only a passing grade on the BCSE. At the higher secondary level, students have to choose between four streams (depending on their BCSE results): Arts, Commerce, Rigzhung, and Science. Those in the Science stream have greater opportunities to pursue STEM-related undergraduate majors at the tertiary level, after completing the Bhutan Higher Secondary Education Certificate (BHSEC) exam upon finishing grade 12. A limited number of students from technical training institutes may also continue their education at the tertiary level. Source: Authors' illustration based on the Annual Education Statistics 2018 (Ministry of Education, Royal Government of Bhutan).

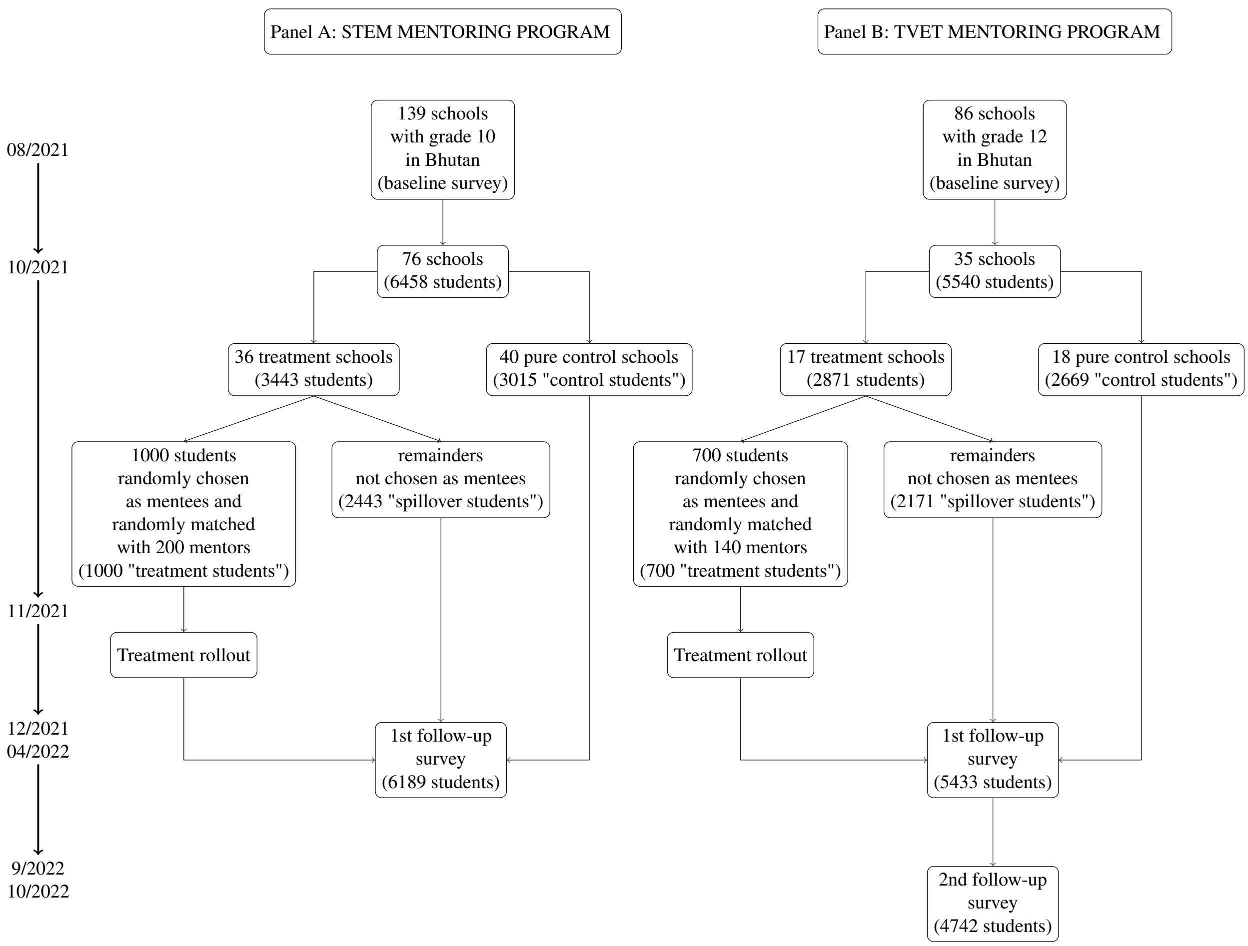

Figure 2: Study timeline

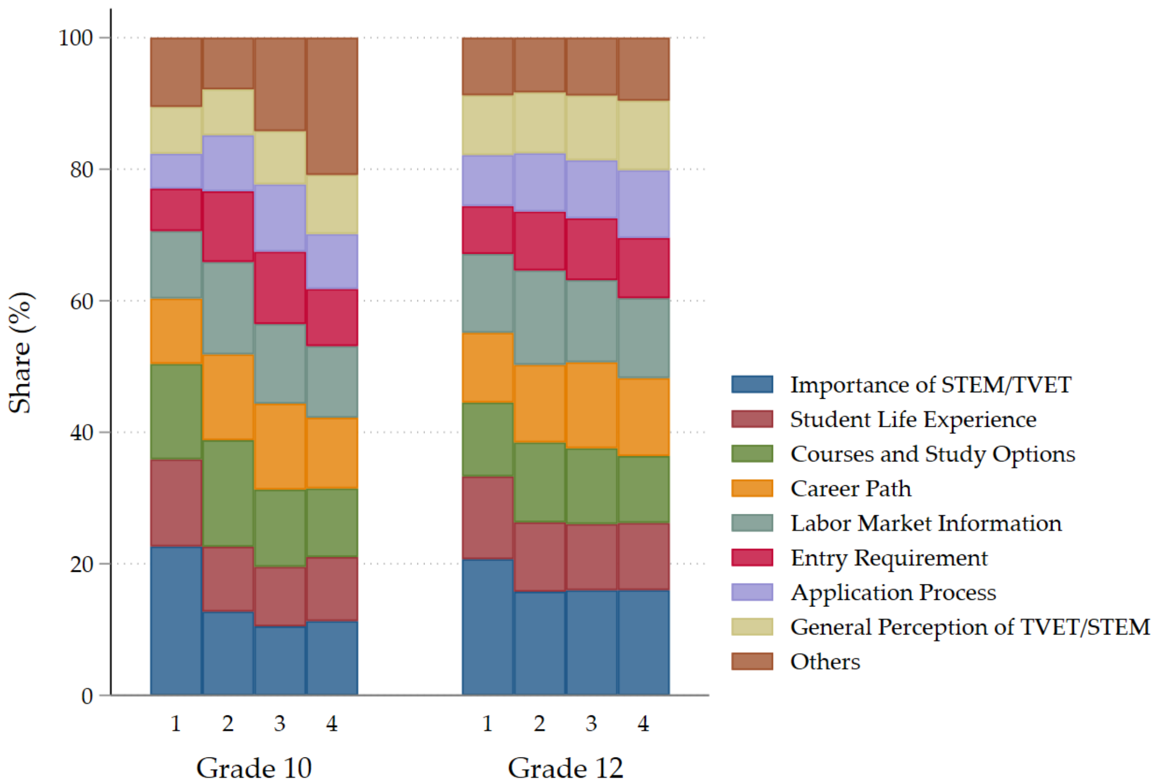

Figure 3: Distribution of discussion time by topic in mentoring sessions

Notes: This figure shows the average distribution of time spent on different topics during the four mentoring sessions, based on mentor self-reports submitted after each session. Mentors reported the proportion of time allocated to each topic within a session. The "Others" category captures broader academic and personal discussions–such as motivation, study strategies, and time management–as identified through text analysis of open-ended responses (see Appendix Figures A3 and A4).

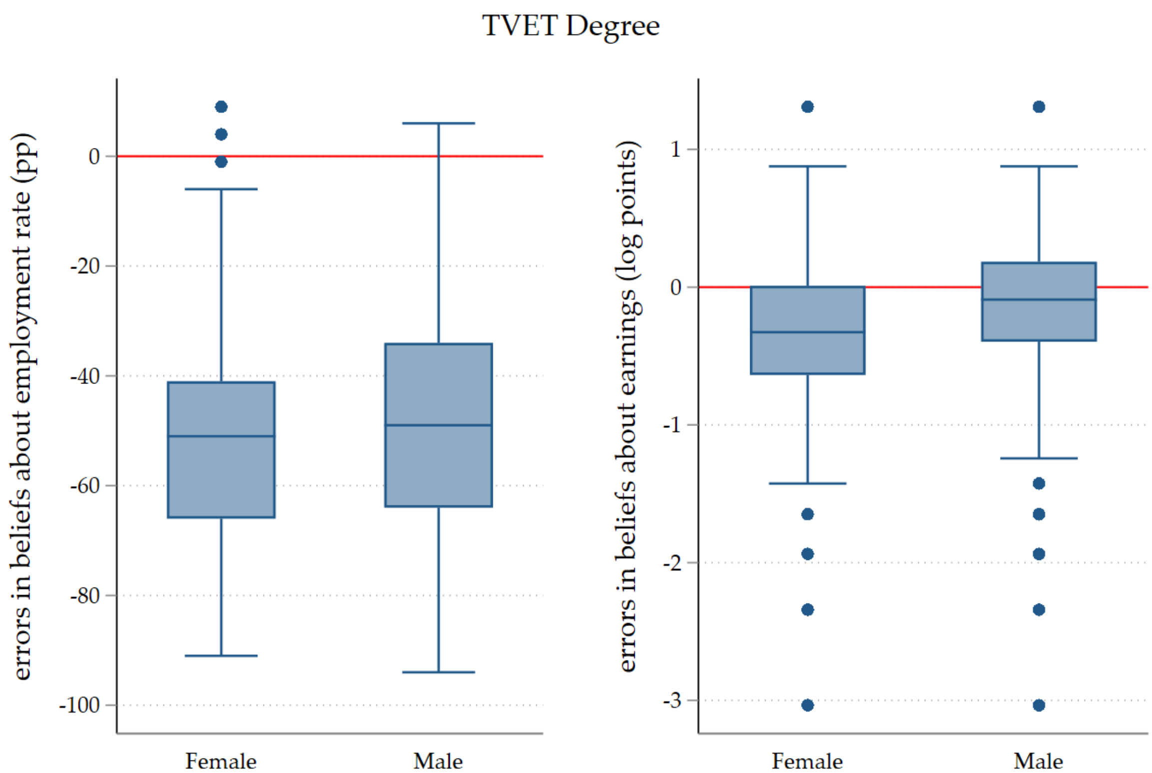

Figure 4: Errors in beliefs about population labor market outcomes, Grade 12 sample

Notes: This figure shows the distribution of errors in students' beliefs about labor market outcomes associated with a TVET degree, separately by gender. The left panel plots errors in beliefs about the employment rate (in percentage points), and the right panel shows errors in beliefs about earnings (in log points). Errors are calculated as the student's stated belief minus the true value from the nationally representative labor force survey data 2019. Negative values indicate an underestimation of the true outcome. The box represents the interquartile range (IQR), with the line indicating the median. Whiskers extend to 1.5 times the IQR, and dots represent outliers. A value of 0 (red line) would indicate a perfectly accurate belief. Most students significantly underestimate TVET employment rates and earnings.

Supplementary Materials for Online Publication

Mentoring, Educational Preferences, and Career Choice: Evidence from Two Field Experiments in Bhutan

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A Appendix Tables and Figures

Appendix Tables

Table A1: Literature Review

Study	Country	Intervention	Findings
Rodriguez-Planas (2012)	US	A comprehensive support initiative for low-performing high school students, offering mentoring, educational services (tutoring and life skills training), and financial incentives to promote engagement and progress. Mentors, who were full-time case managers with prior social services experience, coordinated and delivered support to 15-25 students over 4-5 years, helping them overcome personal, family, and social barriers to education.	Increased high school graduation rates and postsecondary enrollment, with no effects on employment outcomes five years later. More positive impact on female participants than on male participants.
Heller et al. (2017)	US	Mentoring embedded in a school-based group cognitive behavioral therapy program for male-identifying students in grades 7–12, targeting those at risk of dropping out or becoming involved in the justice system. Participants attended weekly one-hour sessions—up to 27 per year—during the school day, in groups of 10–12, over a single academic year.	Improved academic engagement and reduced arrest rates.
Oreopoulos, Brown, and Lavecchia (2017), Lavecchia, Oreopoulos, and Brown (2020)	Canada	A comprehensive support program that integrates mentoring, tutoring, group activities, and financial incentives, targeting high school students from very low socioeconomic backgrounds. Mentoring groups typically consisted of about 15 youths and three volunteer mentors, often university students. Students selected at least two activities each month, designed to foster social and group work skills and community engagement. The program supported students from grade 9 through their high school years.	Increased high school graduation and postsecondary enrollment rates, along with higher adult annual earnings, improved employment outcomes, and reduced welfare dependency.
Ganimian, Barrera-Osorio, Biehl, and Cortelezzi (2020)	Argentina	A program combining scholarship and mentoring, targeting secondary school students. Mentors typically hold degrees in psychology, social work, education, or teacher-training programs. Mentees receive an average of seven 30-minute individual sessions and two 1-hour group sessions.	Improved academic behaviors (e.g., studying before exams, catching up on missed work) but little impact on broader academic mindsets (e.g., self-beliefs, grit, metacognition). Enhanced school performance in the first year (e.g., grades, attendance, passing rates), with no similar gains in subsequent years.

Literature Review

Study	Country	Intervention	Findings
Guryan et al. (2021)	US	A structured mentoring program lasted for two years, targeting students who are at risk of disengagement or dropping out of school. Mentors are typically an in-school staff member. Mentors are asked to monitor the attendance and school performance of the students on their caseload; serve as case managers, connecting students to social services and school-based resources that the mentors think might help the student to overcome barriers to school attendance; and develop relationships with the students on their caseload.	Decreased absences in grades 5 to 7 but had no detectable effects on students in grades 1 to 4. No impacts on learning outcomes (test scores or GPA). No detectable spillovers to other students within the schools where the program was administered.
Eesley and Wang (2017)	US	Mentoring integrated into an elective entrepreneurship course with student teams on startup projects. Each team paired with two mentors (former/current entrepreneurs), receiving 5-10 hours of support over 10 weeks, including in-person meetings before major presentations, feedback, experience sharing, and network connections.	Increased likelihood of joining a startup, with stronger effects for students whose parents were not entrepreneurs.
Behaghel, Chiodi, and Gurgand (2017)	France	A pure mentoring program for secondary school students in disadvantaged areas. Mentors are voluntary professionals from various fields. Mentors met with students twice a year over three years, helping them explore career paths, job opportunities, and success requirements, complementing school-provided career advice.	Changed students' academic ambitions: fewer chose the scientific high school track and more chose the social sciences track. No impact on professional plans, knowledge about the professional world (types of jobs and the requirements to enter the respective fields), or motivation for schoolwork.
Resnjanskij et al. (2024)	Germany	A pure mentoring program targeting adolescents from the lowest-track secondary schools. Mentors are volunteer university students, and they meet one-on-one with mentees approximately every two weeks for one to two years. Activities include leisure outings and counseling.	For lower socioeconomic status adolescents: improved combined index of math grades, patience/social skills, and labor market orientation after one year; persistent effects on grades and labor market orientation, but not on patience/social skills, three years later, with enhanced school-to-work transition outcomes. No effects observed for higher socioeconomic status adolescents.
This study	Bhutan	Pure mentoring programs targeting middle and high school students, where mentors and mentees meet one-on-one four times, each session lasting one hour, in the month leading up to the final exam. Activities focus on labor market information and experience sharing. STEM Program: Mentors are volunteer university students majoring in STEM disciplines, with mentees from grade 10. TVET program: Mentors are volunteer students or recent graduates from TVET, with mentees from grade 12.	Increased interest in the science academic track and TVET, with no impact on applications or enrollments in these fields. Improved knowledge of the respective fields, improved academic performance for the STEM mentoring program.

Table A2: Comparison of baseline characteristics:
Full baseline sample vs. Final study sample: Grade 9-10 students

	Obs. (1)	Mean All Schools (2)	Mean Sampled Schools (3)	p-value (2) = (3) (4)
Panel A: Demographics				
Age	21825	16.38	16.29	0.000
Male	21825	0.46	0.46	0.562
Father with high school diploma (dummy)	19769	0.19	0.21	0.000
Mother with high school diploma (dummy)	20569	0.12	0.14	0.000
Subjective performance: math	21573	2.59	2.57	0.147
Subjective performance: science	21617	2.68	2.66	0.056
Big 5 extroversion	21698	2.82	2.82	0.346
Big 5 agreeness	21678	3.14	3.12	0.019
Big 5 conscientiousness	21723	2.99	2.94	0.000
Big 5 neuroticism	21709	2.99	3.01	0.089
Big 5 openness	21677	3.55	3.53	0.024
Panel B: Primary Outcomes				
Science as top 1 choice after grade 10 (dummy)	21825	0.36	0.36	0.851
Panel C: Intermediate Outcomes				
STEM-related college majors as top 2 choice after grade 12 (dummy)	21825	0.77	0.77	0.765
Interest in math	21676	3.26	3.24	0.159
Interest in science subjects	21744	3.33	3.30	0.004
Attitude toward science and technology (5-point Likert)	21756	3.94	3.94	0.330
Bias against women in STEM (5-point Likert)	21700	2.36	2.33	0.003
Subjective knowledge on science stream	21397	3.73	3.71	0.082
Expected satisfaction on science stream	21094	2.65	2.61	0.003
Beliefs about approval of parents, friends and society (5-point Likert)	21522	3.90	3.89	0.349
Belief about peers' preference in science	20423	21.18	21.38	0.233
Subjective assessment to enroll and complete science stream	21432	2.68	2.65	0.006

Notes: Column (1) reports the number of observations for each variable based on all Grade 9–10 students who completed the baseline survey. Columns (2) and (3) present the mean values for all surveyed students and for students attending schools included in the final study sample, respectively. Column (4) displays the p-values from tests of equality in means between these two groups.

Table A3: Comparison of baseline characteristics:
Full baseline sample vs. Final study sample: Grade 11-12 students

	Obs.	Mean All Schools	Mean Sampled Schools	p-value (2) = (3)
	(1)	(2)	(3)	(4)
Panel A: Demographics				
Age	21529	18.45	18.35	0.000
Male	21529	0.45	0.45	0.682
Father with high school diploma (dummy)	19018	0.18	0.21	0.000
Mother with high school diploma (dummy)	21470	0.05	0.04	0.450
Subjective performance: english	20987	3.31	3.33	0.067
Subjective performance: dzongkha	21166	3.59	3.63	0.000
Big 5 extroversion	21283	2.86	2.86	0.987
Big 5 agreeness	21197	3.25	3.24	0.092
Big 5 conscientiousness	21290	3.10	3.07	0.000
Big 5 neuroticism	21274	2.99	3.01	0.019
Big 5 openness	21209	3.74	3.74	0.355
Panel B: Primary Outcomes				
TVET as top 3 choice after grade 12 genuine interest (dummy)	21529	0.22	0.21	0.069
TVET as top 3 choice after grade 12 if decide today (dummy)	21529	0.20	0.18	0.006
Panel C: Intermediate Outcomes				
Bias against blue-collar jobs	20490	3.27	3.26	0.761
Attitude toward science and technology (5-point Likert)	21417	4.15	4.12	0.008
Bias against women in TVET	19925	2.39	2.35	0.006
Subjective knowledge on TVET	21020	3.21	3.15	0.000
Expected satisfaction on TVET index	19707	3.35	3.30	0.000
Approval index if choosing TVET	18228	51.62	50.99	0.020
Belief index about peers' preference in TVET	20370	10.36	10.08	0.000
Subjective assessment to enroll and complete TVET	19672	2.94	2.90	0.000
Belief on own employment (%) with TVET degree	18831	46.95	46.18	0.003
Belief on own earnings (Nu 000) with TVET degree	20371	21.85	22.19	0.053

Notes: Column (1) reports the number of observations for each variable based on all Grade 11–12 students who completed the baseline survey. Columns (2) and (3) present the mean values for all surveyed students and for students attending schools included in the final study sample, respectively. Column (4) displays the p-values from tests of equality in means between these two groups.

Table A4: The impacts of mentoring on stated preferences, Grade 10 sample

	Obs.	Control Mean (SD)	Treatment Effects (s.e.)	Spillover Effects (s.e.)	Treatment vs. Spillover (s.e.)
	(1)	(2)	(3)	(4)	(5)
Science as top 1 choice after grade 10 (dummy)	6189	0.44	0.158***	0.041**	0.101***
		(0.50)	(0.021)	(0.015)	(0.018)
			[0.004]	[0.004]	[0.004]
Arts as top 1 choice after grade 10 (dummy)	6189	0.29	-0.097***	-0.026*	-0.061***
		(0.46)	(0.020)	(0.015)	(0.017)
			[0.004]	[0.036]	[0.004]
Commerce as top 1 choice after grade 10 (dummy)	6189	0.16	-0.037***	-0.010	-0.020
		(0.37)	(0.010)	(0.013)	(0.014)
			[0.004]	[0.402]	[0.151]
Rigzhung as top 1 choice after grade 10 (dummy)	6189	0.07	-0.002	-0.001	-0.005
		(0.25)	(0.012)	(0.008)	(0.010)
			[0.769]	[0.797]	[0.669]
TVET as top 1 choice after grade 10 (dummy)	6189	0.03	-0.014**	-0.007	-0.009
		(0.18)	(0.006)	(0.005)	(0.007)
			[0.008]	[0.096]	[0.155]

Notes: Same as Table 5.

Table A5: The impacts of mentoring on academic preference and performance, Grade 10 sample

	Obs.	Control Mean (SD)	Treatment Effects (s.e.)	Spillover Effects (s.e.)	Treatment vs. Spillover (s.e.)
	(1)	(2)	(3)	(4)	(5)
BCSE math score index	6228	0.00	0.009	0.034	-0.010
		(1.00)	(0.081)	(0.075)	(0.028)
			[0.984]	[0.968]	[0.996]
BCSE physics score index	6228	0.00	0.093	0.079	0.016
		(1.00)	(0.077)	(0.086)	(0.027)
			[0.239]	[0.665]	[0.988]
BCSE chemistry score index	6228	0.00	-0.030	-0.034	0.007
		(1.00)	(0.114)	(0.125)	(0.027)
			[0.936]	[0.996]	[0.996]
BCSE biology score index	6228	-0.00	0.031	0.017	0.001
		(1.00)	(0.094)	(0.098)	(0.027)
			[0.884]	[1.000]	[0.996]

Notes: Same as Table 5.

Table A6: The impacts of mentoring on other outcomes, Grade 12 sample

	Obs.	Control Mean (SD)	Treatment Effects (s.e.)	Spillover Effects (s.e.)	Treatment vs. Spillover (s.e.)
	(1)	(2)	(3)	(4)	(5)
Administrative: Application to TVET (dummy)	5540	0.13	0.018	0.023*	-0.006
		(0.33)	(0.016)	(0.012)	(0.016)
			{0.318}	{0.117}	
			[0.777]	[0.052]	[1.000]
Administrative: Admission to TVET (dummy)	5540	0.08	0.008	0.010	-0.004
		(0.27)	(0.013)	(0.011)	(0.013)
			{0.581}	{0.446}	
			[0.996]	[0.681]	[1.000]
z-score: preparedness final dzongkha exam	5414	-0.00	0.054	-0.127	0.075*
		(1.00)	(0.082)	(0.079)	(0.045)
			{0.601}	{0.270}	
			[0.996]	[0.143]	[0.817]
z-score: preparedness final english exam	5390	0.00	0.036	-0.138*	0.057
		(1.00)	(0.079)	(0.072)	(0.046)
			{0.717}	{0.170}	
			[0.996]	[0.052]	[0.980]
z-score: preparedness final exam overall	5195	0.00	0.053	-0.091	0.042
		(1.00)	(0.087)	(0.079)	(0.046)
			{0.620}	{0.422}	
			[0.996]	[0.414]	[0.996]
Passed BHSEC certificate (dummy)	5420	0.81	0.029	0.026	-0.017
		(0.40)	(0.030)	(0.035)	(0.016)
			{0.484}	{0.621}	
			[0.869]	[0.757]	[0.992]
BHSEC english score index	5386	-0.00	-0.018	-0.117	-0.017
		(1.00)	(0.105)	(0.116)	(0.034)
			{0.887}	{0.471}	
			[0.996]	[0.546]	[1.000]
BHSEC dzongkhag score index	5381	0.00	0.072	-0.039	-0.006
		(1.00)	(0.169)	(0.188)	(0.032)
			{0.759}	{0.892}	
			[0.996]	[0.924]	[1.000]

Notes: Same as Table 5.

Table A7: The impacts of mentoring on objective knowledge, Grade 12 sample

	Obs.	Control Mean (SD)	Treatment Effects (s.e.)	Spillover Effects (s.e.)	Treatment vs. Spillover (s.e.)
	(1)	(2)	(3)	(4)	(5)
Objective knowledge on science stream index	5422	0.00	0.100*	-0.022	0.118**
		(1.00)	(0.051)	(0.034)	(0.046)
			{0.083}	{0.571}	
			[0.016]	[0.625]	[0.195]
Objective knowlege: admission eligibility (dummy)	5422	0.36	0.055*	-0.003	0.056**
		(0.48)	(0.027)	(0.016)	(0.023)
			{0.073}	{0.876}	
			[0.016]	[0.944]	
Objective knowlege: registration (dummy)	5422	0.48	-0.020	-0.003	-0.006
		(0.50)	(0.024)	(0.017)	(0.024)
			{0.462}	{0.892}	
			[0.239]	[0.944]	
Objective knowlege: interview criteria (dummy)	5422	0.40	0.066**	-0.016	0.069***
		(0.49)	(0.024)	(0.018)	(0.023)
			{0.014}	{0.482}	
			[0.004]	[0.506]	

Notes: Same as Table 5.

Table A8: The impacts of mentoring on stated preferences and actual decisions, IV-LATE

	Obs.	Control Mean (SD)	OLS ITT (s.e.)	IV LATE (s.e.)
	(1)	(2)	(3)	(4)
Grade 10 sample				
Science as top 1 choice after grade 10 (dummy)	6189	0.44	0.158***	0.166***
		(0.50)	(0.021)	(0.022)
			[0.004]	[0.004]
Enrolled in science stream in grade 11 (dummy)	6458	0.28	-0.002	-0.002
		(0.45)	(0.029)	(0.030)
			[0.984]	[0.984]
Grade 12 sample				
TVET as top 3 choice after grade 12 genuine interest (dummy)	5433	0.19	0.058***	0.091***
		(0.39)	(0.021)	(0.031)
			{0.019}	{0.012}
			[0.008]	[0.008]
TVET as top 3 choice after grade 12 if decide today (dummy)	5433	0.16	0.040**	0.063**
		(0.37)	(0.018)	(0.028)
			{0.036}	{0.035}
			[0.036]	[0.028]
Survey: Application to TVET (dummy)	4739	0.07	-0.009	-0.013
		(0.26)	(0.019)	(0.029)
			{0.705}	{0.709}
			[0.996]	[0.996]
Survey: Admission to TVET (dummy)	4739	0.03	-0.007	-0.011
		(0.18)	(0.011)	(0.017)
			{0.587}	{0.597}
			[0.996]	[0.996]

Notes: Column (1) shows the number of observations for each variable. Column (2) shows the control group's means and standard deviations. Column (3) replicates the ITT effect as in Table 5. Column (4) presents the IV-LATE estimate, using treatment assignment as IV for students' actual full participation in the mentoring programs. Clustered standard errors at the school level are in parentheses. Wild-cluster bootstrapped p-values are in braces and Romano-Wolf stepdown adjusted p-values for multiple inferences are reported in brackets. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Table A9: Baseline differences in outcome variables by gender, Grade 10 sample

	Obs.	Control Mean (SD)	Male Mentor & Male Mentee (s.e.)	Male Mentor & Female Mentee (s.e.)	Female Mentor & Male Mentee (s.e.)	Female Mentor & Female Mentee (s.e.)	p-value (3) = (4)	p-value (3) = (5)	p-value (3) = (6)	p-value (4) = (5)	p-value (4) = (6)	p-value (5) = (6)
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Grade 10 sample												
Science as top 1 choice after grade 10 (dummy)	6458	0.38	-0.014	-0.083***	0.025	-0.027	0.120	0.439	0.813	0.013	0.136	0.239
			(0.038)	(0.027)	(0.036)	(0.035)						
STEM-related college majors as top 2 choice after grade 12 (dummy)	6458	0.74	-0.019	-0.033	0.022	0.022	0.772	0.318	0.251	0.271	0.149	0.993
			(0.031)	(0.034)	(0.036)	(0.030)						
Interest in math index	6430	-0.00	0.182***	-0.220***	0.207**	-0.094	0.000	0.788	0.004	0.000	0.146	0.023
			(0.068)	(0.059)	(0.095)	(0.086)						
Interest in science subjects index	6451	-0.00	-0.006	-0.257***	0.088	-0.067	0.002	0.302	0.456	0.000	0.012	0.107
			(0.075)	(0.060)	(0.090)	(0.072)						
Interest in studying overall index	6116	-0.00	0.006	-0.057	0.084	-0.051	0.410	0.228	0.434	0.148	0.948	0.154
			(0.063)	(0.068)	(0.076)	(0.074)						
Attitude to science and technology index	6442	0.00	-0.015	-0.013	-0.008	0.110*	0.980	0.936	0.122	0.951	0.082	0.158
			(0.068)	(0.060)	(0.081)	(0.065)						
Bias against women in STEM index	6451	0.00	0.233**	-0.188*	0.262**	-0.323***	0.000	0.790	0.000	0.001	0.162	0.000
			(0.096)	(0.096)	(0.113)	(0.086)						
Subjective knowledge on science stream index	6345	0.00	0.016	-0.062	0.058	0.060	0.241	0.583	0.636	0.121	0.094	0.982
			(0.073)	(0.062)	(0.082)	(0.074)						
Expected satisfaction on science stream index	6309	0.00	0.017	-0.195**	0.062	-0.025	0.064	0.659	0.689	0.010	0.088	0.358
			(0.090)	(0.077)	(0.081)	(0.083)						
Approval index if choosing science	6397	-0.00	-0.041	0.047	0.022	0.038	0.314	0.408	0.406	0.774	0.911	0.878
			(0.063)	(0.061)	(0.072)	(0.071)						
Belief index about peers' preference in science	6119	-0.00	-0.052	-0.156**	0.116	-0.145*	0.268	0.185	0.332	0.021	0.879	0.004
			(0.095)	(0.069)	(0.114)	(0.085)						
Subjective assessment to enroll and complete science stream index	6383	0.00	0.047	-0.220***	0.114	-0.066	0.004	0.463	0.285	0.000	0.087	0.150
			(0.085)	(0.064)	(0.088)	(0.093)						

Notes: Column (1) shows the number of observations for each variable. Column (2) shows the control group's means and standard deviations. Columns (3)–(6) indicate mean differences with the control group, after controlling for strata fixed effects (equation 3). Standard errors clustered at the school level are in parentheses. Column (7)-(12) presents the p-values of tests of equality between effects in corresponding columns. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Table A10: Baseline differences in outcome variables by gender, Grade 12 sample

	Obs.	Control Mean (SD)	Male Mentor & Male Mentee (s.e.)	Male Mentor & Female Mentee (s.e.)	Female Mentor & Male Mentee (s.e.)	Female Mentor & Female Mentee (s.e.)	p-value (3) = (4)	p-value (3) = (5)	p-value (3) = (6)	p-value (4) = (5)	p-value (4) = (6)	p-value (5) = (6)
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Grade 10 sample												
TVET as top 3 choice after grade 12 genuine interest (dummy)	5540	0.20	0.022	-0.030	0.095	-0.106**	0.089	0.305	0.003	0.079	0.042	0.014
			(0.033)	(0.024)	(0.071)	(0.039)						
			{0.551}	{0.304}	{0.244}	{0.021}						
TVET as top 3 choice after grade 12 if decide today (dummy)	5540	0.17	0.056	0.013	0.061	-0.090**	0.265	0.913	0.000	0.310	0.042	0.014
			(0.037)	(0.027)	(0.045)	(0.039)						
			{0.185}	{0.628}	{0.203}	{0.068}						
Bias against blue-collar jobs index	5303	0.00	-0.108	0.119*	0.197**	-0.056	0.137	0.027	0.659	0.354	0.035	0.011
			(0.132)	(0.062)	(0.092)	(0.065)						
			{0.513}	{0.071}	{0.049}	{0.469}						
Attitude to science and technology index	5515	-0.00	-0.015	-0.024	-0.330*	0.022	0.938	0.068	0.727	0.118	0.615	0.099
			(0.077)	(0.059)	(0.185)	(0.086)						
			{0.839}	{0.713}	{0.096}	{0.812}						
Bias against women in TVET index	5161	0.00	0.074	0.116	0.094	-0.035	0.645	0.854	0.268	0.789	0.019	0.193
			(0.090)	(0.069)	(0.107)	(0.078)						
			{0.431}	{0.141}	{0.411}	{0.671}						
Subjective knowledge on TVET index	5415	0.00	-0.039	-0.069	0.140	-0.052	0.648	0.129	0.907	0.099	0.889	0.155
			(0.063)	(0.078)	(0.107)	(0.123)						
			{0.560}	{0.417}	{0.250}	{0.701}						
Expected satisfaction on TVET index	5022	-0.00	0.019	0.022	-0.021	-0.038	0.962	0.706	0.704	0.723	0.653	0.919
			(0.076)	(0.081)	(0.098)	(0.129)						
			{0.809}	{0.803}	{0.845}	{0.772}						
Approval index if choosing TVET	4708	-0.00	0.008	-0.014	0.169	0.004	0.755	0.335	0.971	0.197	0.860	0.455
			(0.082)	(0.051)	(0.138)	(0.117)						
			{0.916}	{0.797}	{0.296}	{0.970}						
Belief index about peers' preference in TVET	5185	0.00	-0.002	0.022	-0.013	-0.219	0.812	0.937	0.019	0.784	0.098	0.269
			(0.087)	(0.100)	(0.099)	(0.140)						
			{0.981}	{0.845}	{0.894}	{0.145}						
Subjective assessment to enroll and complete TVET index	4988	0.00	-0.049	-0.235***	-0.114	-0.059	0.004	0.629	0.920	0.361	0.048	0.780
			(0.059)	(0.055)	(0.139)	(0.106)						
			{0.423}	{0.000}	{0.448}	{0.639}						
Belief on own employment (%) with TVET degree	4878	46.37	1.993	-0.874	0.104	0.738	0.129	0.540	0.593	0.727	0.536	0.869
			(1.623)	(1.302)	(2.633)	(2.343)						
			{0.250}	{0.536}	{0.966}	{0.753}						
Belief on own earnings (Nu 000) with TVET degree	5208	22.16	3.824**	-0.383	1.374	-2.000*	0.010	0.170	0.000	0.212	0.140	0.020
			(1.465)	(1.028)	(1.496)	(1.154)						
			{0.012}	{0.719}	{0.457}	{0.111}						

Notes: Column (1) shows the number of observations for each variable. Column (2) shows the control group's means and standard deviations. Columns (3)–(6) indicate mean differences with the control group, after controlling for strata fixed effects (equation 3). Standard errors clustered at the school level are in parentheses. Column (7)-(12) presents the p-values of tests of equality between effects in corresponding columns. Wild-cluster bootstrapped p-values are in braces. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Table A11: The impacts of mentoring on stated preferences and actual decisions, by gender

	Obs.	Control Mean (SD)	Male Mentor & Male Mentee (s.e.)	Male Mentor & Female Mentee (s.e.)	Female Mentor & Male Mentee (s.e.)	Female Mentor & Female Mentee (s.e.)	p-value (3) = (4)	p-value (3) = (5)	p-value (3) = (6)	p-value (4) = (5)	p-value (4) = (6)	p-value (5) = (6)
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Grade 10 sample												
Science as top 1 choice after grade 10 (dummy)	6189	0.44	0.213***	0.125***	0.168***	0.136***	0.078	0.237	0.123	0.295	0.811	0.380
			(0.032)	(0.037)	(0.028)	(0.036)						
Enrolled in science stream in grade 11 (dummy)	6458	0.28	0.021	-0.029	0.026	-0.012	0.186	0.896	0.316	0.181	0.589	0.361
			(0.037)	(0.032)	(0.044)	(0.035)						
Grade 12 sample												
TVET as top 3 choice after grade 12 genuine interest (dummy)	5433	0.19	-0.010	0.089***	0.124***	0.056	0.025	0.005	0.170	0.344	0.592	0.201
			(0.031)	(0.023)	(0.043)	(0.056)						
			{0.776}	{0.004}	{0.014}	{0.339}						
TVET as top 3 choice after grade 12 if decide today (dummy)	5433	0.16	0.005	0.048**	0.075	0.063	0.251	0.337	0.317	0.701	0.787	0.895
			(0.029)	(0.022)	(0.074)	(0.045)						
			{0.851}	{0.047}	{0.416}	{0.214}						
Survey: Application to TVET (dummy)	4739	0.07	-0.012	-0.018	0.024	-0.003	0.817	0.455	0.773	0.429	0.584	0.605
			(0.027)	(0.021)	(0.049)	(0.026)						
			{0.696}	{0.489}	{0.647}	{0.911}						
Survey: Admission to TVET (dummy)	4739	0.03	-0.015	-0.008	0.003	0.004	0.657	0.652	0.260	0.787	0.544	0.982
			(0.015)	(0.010)	(0.043)	(0.017)						
			{0.332}	{0.466}	{0.969}	{0.814}						

Notes: Column (1) shows the number of observations for each variable. Column (2) shows the control group's means and standard deviations. Columns (3)–(6) indicate mean differences with the control group, after controlling for values of the outcome when available, baseline covariates as specified in Tables **??** and **??**, and strata fixed effects (equation 3). Standard errors clustered at the school level are in parentheses. Column (7)-(12) presents the p-values of tests of equality between effects in corresponding columns. Wild-cluster bootstrapped p-values are in braces. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Table A12: Baseline differences in outcome variables: same-gender vs. cross-gender, Grade 10 sample

	Obs.	Control Mean (SD)	Same Gender (s.e.)	Cross Gender (s.e.)	p-value (3) = (4)
	(1)	(2)	(3)	(4)	(5)
Grade 10 sample					
Science as top 1 choice after grade 10 (dummy)	6458	0.38	-0.020	-0.035	0.427
			(0.025)	(0.023)	
STEM-related college majors as top 2 choice after grade 12 (dummy)	6458	0.74	0.000	-0.020	0.666
			(0.025)	(0.024)	
Interest in math index	6430	-0.00	0.052	-0.067	0.097
			(0.061)	(0.056)	
Interest in science subjects index	6451	-0.00	-0.035	-0.130**	0.118
			(0.061)	(0.052)	
Interest in studying overall index	6116	-0.00	-0.021	-0.009	0.777
			(0.058)	(0.049)	
Attitude to science and technology index	6442	0.00	0.044	-0.023	0.296
			(0.053)	(0.051)	
Bias against women in STEM index	6451	0.00	-0.027	-0.008	0.943
			(0.075)	(0.066)	
Subjective knowledge on science stream index	6345	0.00	0.036	-0.003	0.276
			(0.057)	(0.051)	
Expected satisfaction on science stream index	6309	0.00	-0.003	-0.084	0.221
			(0.069)	(0.060)	
Approval index if choosing science	6397	-0.00	-0.004	0.045	0.487
			(0.047)	(0.044)	
Belief index about peers' preference in science	6119	-0.00	-0.096	-0.037	0.496
			(0.077)	(0.053)	
Subjective assessment to enroll and complete science stream index	6383	0.00	-0.006	-0.076	0.211
			(0.072)	(0.053)	

Notes: Column (1) shows the number of observations for each variable. Column (2) shows the control group's means and standard deviations. Columns (3)–(4) indicate mean differences with the control group, after controlling for strata fixed effects (equation 3). Standard errors clustered at the school level are in parentheses. Column (5) presents the p-value from tests of equality in the effects between same-gender and cross-gender treatment groups. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Table A13: Baseline differences in outcome variables: same-gender vs. cross-gender, Grade 12 sample

	Obs.	Control Mean (SD)	Same Gender (s.e.)	Cross Gender (s.e.)	p-value (3) = (4)
	(1)	(2)	(3)	(4)	(5)
Grade 12 sample					
TVET as top 3 choice after grade 12 genuine interest (dummy)	5540	0.20	-0.019	-0.011	0.555
			(0.029)	(0.021)	
			{0.541}	{0.682}	
TVET as top 3 choice after grade 12 if decide today (dummy)	5540	0.17	0.010	0.013	0.690
			(0.035)	(0.022)	
			{0.793}	{0.574}	
Bias against blue-collar jobs index	5303	0.00	-0.090	0.121**	0.049
			(0.102)	(0.057)	
			{0.469}	{0.050}	
Attitude to science and technology index	5515	-0.00	-0.004	-0.082	0.298
			(0.063)	(0.056)	
			{0.943}	{0.181}	
Bias against women in TVET index	5161	0.00	0.039	0.087	0.280
			(0.072)	(0.062)	
			{0.627}	{0.200}	
Subjective knowledge on TVET index	5415	0.00	-0.043	-0.042	0.752
			(0.070)	(0.055)	
			{0.589}	{0.460}	
Expected satisfaction on TVET index	5022	-0.00	0.000	0.015	0.826
			(0.067)	(0.055)	
			{1.000}	{0.799}	
Approval index if choosing TVET	4708	-0.00	0.007	0.013	0.822
			(0.080)	(0.046)	
			{0.930}	{0.773}	
Belief index about peers' preference in TVET	5185	0.00	-0.071	-0.001	0.430
			(0.100)	(0.070)	
			{0.517}	{0.988}	
Subjective assessment to enroll and complete TVET index	4988	0.00	-0.052	-0.185***	0.015
			(0.060)	(0.052)	
			{0.435}	{0.003}	
Belief on own employment (%) with TVET degree	4878	46.37	1.580	-0.306	0.227
			(1.533)	(1.205)	
			{0.340}	{0.803}	
Belief on own earnings (Nu 000) with TVET degree	5208	22.16	1.916	0.072	0.113
			(1.251)	(1.002)	
			{0.159}	{0.940}	

Notes: Column (1) shows the number of observations for each variable. Column (2) shows the control group's means and standard deviations. Columns (3)–(6) indicate mean differences with the control group, after controlling for strata fixed effects (equation 3). Standard errors clustered at the school level are in parentheses. Column (5) presents the p-value from tests of equality in the effects between same-gender and cross-gender treatment groups. Wild-cluster bootstrapped p-values are in braces. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Table A14: The impacts of mentoring on stated preferences and actual decisions, same-gender vs. cross-gender

	Obs.	Control Mean (SD)	Same Gender (s.e.)	Cross Gender (s.e.)	p-value (3) = (4)
	(1)	(2)	(3)	(4)	(5)
Grade 10 sample					
Science as top 1 choice after grade 10 (dummy)	6189	0.44	0.175***	0.125***	0.270
			(0.023)	(0.026)	
Enrolled in science stream in grade 11 (dummy)	6458	0.28	0.005	-0.008	0.635
			(0.032)	(0.024)	
Grade 12 sample					
TVET as top 3 choice after grade 12 genuine interest (dummy)	5433	0.19	0.012	0.079***	0.045
			(0.034)	(0.024)	
			{0.742}	{0.008}	
TVET as top 3 choice after grade 12 if decide today (dummy)	5433	0.16	0.024	0.031	0.434
			(0.023)	(0.031)	
			{0.313}	{0.338}	
Survey: Application to TVET (dummy)	4739	0.07	-0.009	-0.008	0.949
			(0.022)	(0.019)	
			{0.714}	{0.692}	
Survey: Admission to TVET (dummy)	4739	0.03	-0.009	-0.005	0.872
			(0.013)	(0.014)	
			{0.533}	{0.803}	

Notes: Column (1) shows the number of observations for each variable. Column (2) shows the control group's means and standard deviations. Columns (3)–(4) indicate mean differences with the control group, after controlling for values of the outcome when available, baseline demographics, and strata fixed effects (equation 3). Standard errors clustered at the school level are in parentheses. Column (5) presents the p-value from tests of equality in the effects between same-gender and cross-gender treatment groups. Wild-cluster bootstrapped p-values are in braces. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Table A15: The impacts of mentoring on stated preferences and actual decisions, by perceived performance and preference, Grade 10 sample

	Obs.	Control Mean (SD)	Perceived Performance: Bottom 75%	Perceived Performance: Top 25%	p-value (3) = (4)	Interest in Science: Bottom 75%	Interest in Science: Top 25%	p-value (6) = (7)
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Science as top 1 choice after grade 10 (dummy)	6189	0.44	0.176***	0.113***	0.005	0.173***	0.126***	0.064
		(0.50)	(0.022)	(0.022)		(0.024)	(0.025)	
Enrolled in science stream in grade 11 (dummy)	6458	0.28	-0.009	0.015	0.496	-0.021	0.039	0.027
		(0.45)	(0.028)	(0.028)		(0.028)	(0.037)	

Notes: Column (1) shows the number of observations for each variable. Column (2) shows the control group's means and standard deviations. Columns (3)–(4) and (6)-(7) indicate mean differences with the control group, after controlling for values of the outcome when available, baseline demographics, and strata fixed effects (equation 3). Standard errors clustered at the school level are in parentheses. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Table A16: The impacts of mentoring on stated preferences and actual decisions, by bias and perceived parental approval, Grade 12 sample

	Obs.	Control Mean (SD)	Bias Against Blue-collar Jobs: Bottom 50%	Bias Against Blue-collar Jobs: Top 50%	p-value (3) = (4)	Perceived Approval: Bottom 50%	Perceived Approval: Top 50%	p-value (6) = (7)
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
TVET as top 3 choice after grade 12 genuine interest (dummy)	5433	0.19	0.086**	0.037	0.309	0.020	0.077***	0.097
		(0.39)	(0.038)	(0.038)		(0.027)	(0.026)	
			{0.028}	{0.184}		{0.474}	{0.016}	
TVET as top 3 choice after grade 12 if decide today (dummy)	5433	0.16	0.049*	0.034	0.666	0.036*	0.043*	0.816
		(0.37)	(0.026)	(0.026)		(0.020)	(0.024)	
			{0.067}	{0.230}		{0.130}	{0.107}	
Survey: Application to TVET (dummy)	4739	0.07	-0.011	-0.007	0.826	-0.040	0.006	0.088
		(0.26)	(0.023)	(0.023)		(0.024)	(0.022)	
			{0.678}	{0.800}		{0.152}	{0.787}	
Survey: Admission to TVET (dummy)	4739	0.03	0.003	-0.014	0.184	-0.032***	0.005	0.013
		(0.18)	(0.014)	(0.014)		(0.011)	(0.013)	
			{0.855}	{0.262}		{0.017}	{0.748}	

Notes: Column (1) shows the number of observations for each variable. Column (2) shows the control group's means and standard deviations. Columns (3)–(4) and (6)-(7) indicate mean differences with the control group, after controlling for values of the outcome when available, baseline demographics, and strata fixed effects (equation 3). Standard errors clustered at the school level are in parentheses. Wild-cluster bootstrapped p-values are in braces. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Table A17: Cost Breakdown of the Intervention

Cost Item	Unit Cost (Nu)
Total cost for each in-person session	550
Of which:	
- Honorarium to mentors	300
- Transportation cost for mentors	250
Total cost for each online session	400
Of which:	
- Honorarium to mentors	300
- Internet fee for mentors	50
- Internet fee for mentees	50

Notes: The table summarizes the intervention costs. The intervention includes one/two initial in-person mentoring sessions, followed by three/two online sessions–totaling four sessions per mentee. The estimated cost per mentee is Nu 1,750-1,900, which is approximately USD 23–25, based on the exchange rate at the time of the intervention. The internet fees included (Nu 50 per mentor and Nu 50 per mentee per online session) represent upper estimates; in practice, actual internet costs typically range from Nu 29 to Nu 49.

Appendix Figures

Figure A1: Study Sample

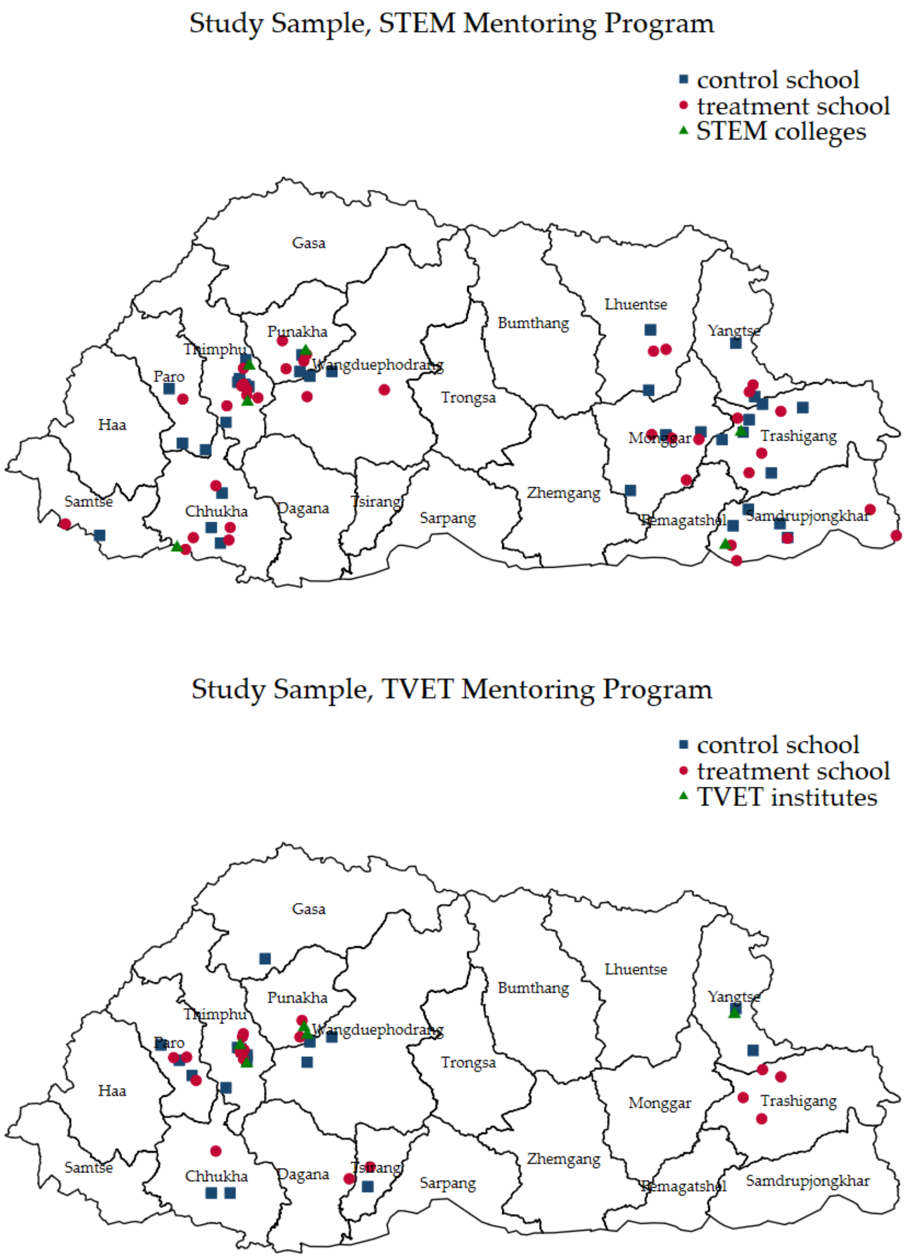
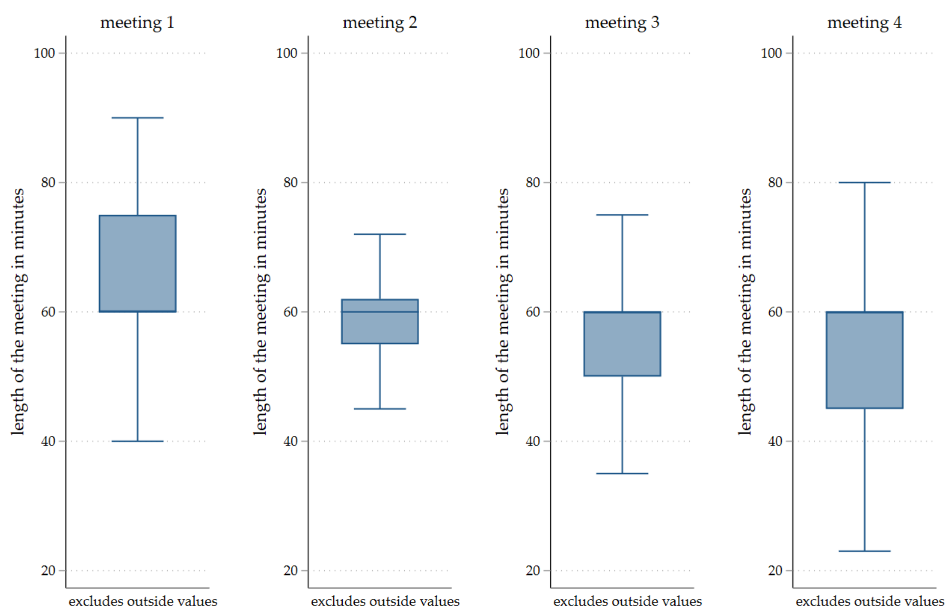
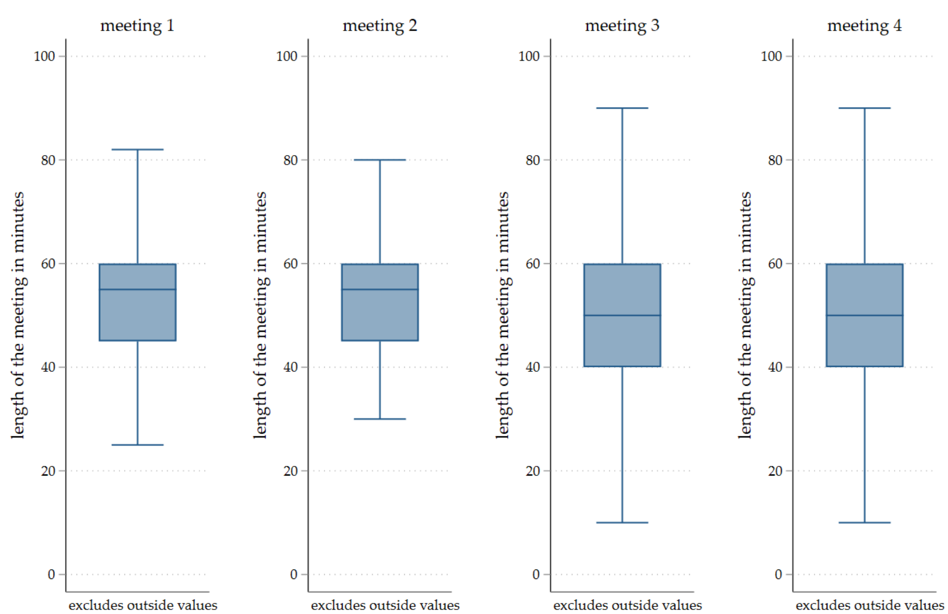


Figure A2: Durations of mentor-mentee meetings

Grade 10



Grade 12



Notes: This figure illustrates the distribution of meeting durations as reported by mentors.

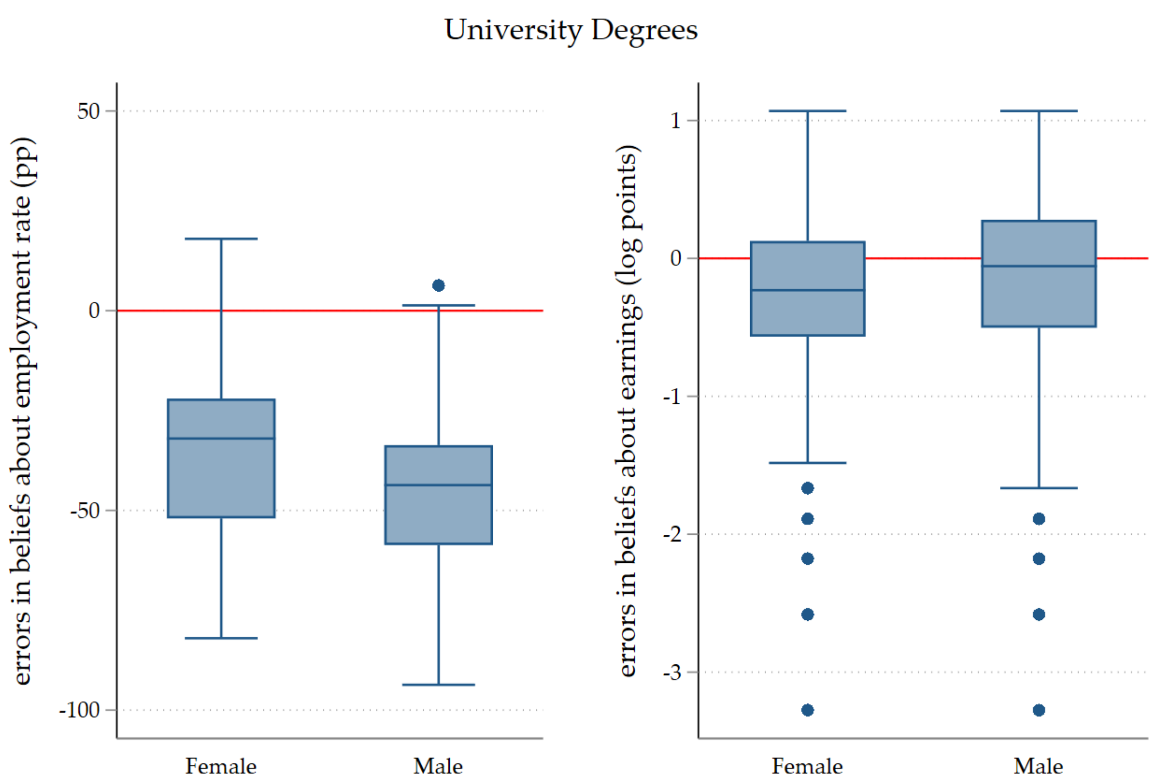
Figure A3: Common Themes in STEM Mentoring Conversations

Notes: This word cloud illustrates the most frequently used words during one-on-one STEM mentoring sessions with Grade 10 students. Prominent themes include academic performance, goal-setting, study habits, and preparation for future careers. The emphasis on terms such as "exam," "goal," and "study" reflects a focus on navigating science-track academic pathways and long-term aspirations.

Figure A4: Common Themes in TVET Mentoring Conversations

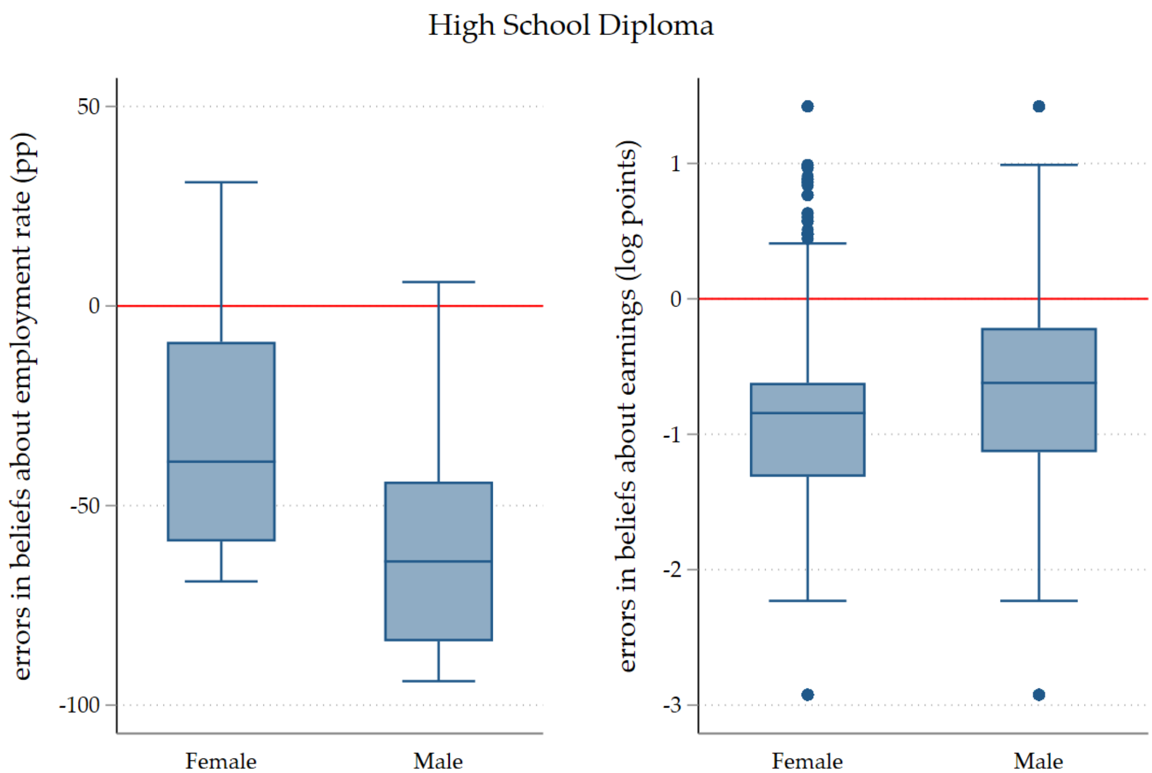
Notes: This word cloud presents the most common words from TVET mentoring sessions with Grade 12 students. The discussion themes center on practical training, qualifications, and job prospects, as reflected in words like “skillful,” “certificate,” “career,” and “system.” Mentors also frequently shared personal experiences, suggesting a relational and applied orientation in TVET mentoring.

Figure A5: Errors in beliefs about population labor market outcomes for university graduates



Notes: This figure shows the distribution of errors in students' beliefs about labor market outcomes associated with a university degree, separately by gender. Other notes are similar to Figure 4.

Figure A6: Errors in beliefs about population labor market outcomes for high school graduates



Notes: This figure shows the distribution of errors in students' beliefs about labor market outcomes associated with a high school diploma, separately by gender. Other notes are similar to Figure 4.

B Baseline Balance

In this section, we assess whether there are systematic differences in missingness across key variables used in the main analysis by estimating equations (1) and (2). For the Grade 10 sample, we observe a few minor imbalances: students in the treatment group are slightly more likely to report their interests in Math and Science and their expectations about the science academic stream (Table B1). However, these differences are small and occur in the context of already high baseline response rates across all groups, as seen in Column 1 of the same table.

In the Grade 12 sample, where belief measures are more central due to higher non-response rates, we find no statistically significant differences in missingness between any group pairs: treatment vs. control, treatment vs. spillover, or spillover vs. control (Table B2).

Overall, these results suggest that missingness is largely balanced across groups and is unlikely to introduce bias into our analysis or interpretation of findings.

Table B1: Baseline balance in missingness, grade 10 sample

	Control	Treat - Control		Spill - Control		Treat - Spill	
		Mean	p-value	Mean	p-value	Mean	p-value
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Interest in math index	0.01	-0.01	0.00	-0.00	0.28	-0.01	0.02
Interest in science subjects index	0.00	-0.00	0.04	-0.00	0.15	-0.00	0.16
Interest in studying overall index	0.06	0.00	0.79	-0.01	0.47	0.00	0.82
Attitude to science and technology index	0.00	-0.00	0.16	-0.00	0.60	-0.00	0.44
Bias against women in STEM index	0.00	-0.00	0.20	0.00	0.20	-0.00	0.05
Subjective knowledge on science stream index	0.02	-0.01	0.26	-0.00	0.77	-0.01	0.19
Expected satisfaction on science stream index	0.03	-0.01	0.02	-0.01	0.26	-0.01	0.09
Approval index if choosing science	0.01	-0.00	0.34	0.00	0.72	-0.01	0.09
Belief index about peers' preference in science	0.06	-0.01	0.42	-0.02	0.16	-0.01	0.39
Subjective assessment to enroll and complete science stream index	0.01	-0.01	0.06	0.00	0.59	-0.01	0.05
Father with high school diploma (dummy)	0.09	-0.00	0.93	-0.01	0.48	0.01	0.52
Mother with high school diploma (dummy)	0.06	0.00	0.83	-0.00	0.67	0.01	0.30
Wealth index (PCA)	0.15	0.01	0.62	-0.00	0.74	-0.00	0.96
Subjective performance index: math	0.01	0.00	0.74	0.00	0.67	-0.00	0.84
Subjective performance index: science subjects	0.01	0.00	0.77	0.00	0.68	-0.00	0.84
Subjective performance index: non-science subjects	0.00	0.00	0.59	0.00	0.58	-0.00	1.00
Subjective performance index: overall	0.07	0.00	0.62	-0.00	0.76	0.00	0.69
Big 5 extroversion index	0.00	-0.00	0.88	-0.00	0.61	0.00	0.38
Big 5 agreeness index	0.01	-0.00	0.24	-0.00	0.11	0.00	0.44
Big 5 conscientiousness index	0.00	-0.00	0.39	-0.00	0.82	-0.00	0.80
Big 5 neuroticism index	0.00	-0.00	0.59	-0.00	0.91	-0.00	0.93
Big 5 openness index	0.01	-0.00	0.34	-0.00	0.67	-0.00	0.90

Notes: This table assesses differences in baseline missingness across key variables used in the main analysis, displaying only those with missing data. Column (1) reports the mean non-response rate in the control group. Columns (2) and (3) show the mean difference between the treatment and control groups, along with the corresponding p-values. Columns (4) and (5) present the same comparison between the spillover and control groups. These differences correspond to coefficients on TREAT and SPILL in across-school regressions that include strata fixed effects and cluster-robust standard errors at the school level. Columns (6) and (7) display the mean difference and p-value between the treatment and spillover groups, estimated using within-school regressions with robust standard errors.

Table B2: Baseline balance in missingness, grade 12 sample

	Control	Treat - Control		Spill - Control		Treat - Spill	
		Mean	p-value	Mean	p-value	Mean	p-value
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Bias against blue-collar jobs index	0.04	-0.01	0.38	0.00	1.00	-0.01	0.36
Attitude to science and technology index	0.00	0.00	0.45	0.00	0.56	0.00	0.43
Bias against women in TVET index	0.07	-0.00	0.67	-0.00	0.77	-0.00	0.81
Subjective knowledge on TVET index	0.02	0.00	0.91	0.00	0.54	0.00	0.89
Expected satisfaction on TVET index	0.10	0.00	0.99	-0.01	0.38	0.01	0.38
Approval index if choosing TVET	0.17	-0.01	0.50	-0.03	0.13	0.02	0.18
Belief index about peers' preference in TVET	0.06	0.02	0.09	0.01	0.60	0.03	0.03
Subjective assessment to enroll and complete TVET index	0.10	0.00	0.85	-0.00	0.90	0.01	0.50
Belief on own employment (%) with TVET degree	0.14	-0.02	0.31	-0.04	0.10	0.01	0.33
Belief on own earnings (Nu 000) with TVET degree	0.06	0.01	0.46	-0.01	0.37	0.02	0.14
Father with high school diploma (dummy)	0.13	0.01	0.74	-0.01	0.41	0.02	0.20
Mother with high school diploma (dummy)	0.00	0.00	0.28	-0.00	0.01	0.01	0.00
Wealth index (PCA)	0.14	0.01	0.68	-0.01	0.51	0.02	0.31
Subjective performance index: english	0.02	-0.01	0.21	-0.01	0.10	0.00	0.71
Subjective performance index: dzongkha	0.01	-0.00	0.59	-0.00	0.67	0.00	0.98
Subjective performance index: overall	0.09	-0.04	0.04	-0.03	0.18	-0.01	0.36
Big 5 extroversion index	0.01	-0.01	0.14	-0.01	0.03	0.00	0.94
Big 5 agreeness index	0.02	-0.01	0.06	-0.01	0.08	-0.00	0.58
Big 5 conscientiousness index	0.01	-0.01	0.09	-0.00	0.09	-0.00	0.63
Big 5 neuroticism index	0.01	-0.01	0.09	-0.01	0.03	0.00	0.98
Big 5 openness index	0.02	-0.01	0.25	-0.01	0.05	0.00	0.65

Notes: This table assesses differences in baseline missingness across key variables used in the main analysis, displaying only those with missing data. Column (1) reports the mean non-response rate in the control group. Columns (2) and (3) show the mean difference between the treatment and control groups, along with the corresponding p-values. Columns (4) and (5) present the same comparison between the spillover and control groups. These differences correspond to coefficients on TREAT and SPILL in across-school regressions that include strata fixed effects and cluster-robust standard errors at the school level. Columns (6) and (7) display the mean difference and p-value between the treatment and spillover groups, estimated using within-school regressions with robust standard errors.

C Attrition Analysis

In this section, we analyze whether attrition is correlated with treatment status following Haushofer and Shapiro (2016). First, we define the dummy variable $attrition_{is}$ that indicates whether student i was surveyed at baseline but not at endline.

In Table C1, we examine whether the probability of attrition is different from treatment, spillover, and pure control students by estimating the following regression:

$$\text{attrition}_{isz} = \beta_0 + \beta_1 \text{TREAT}_{is} + \beta_2 \text{SPILL}_{is} + \delta_z + \epsilon_{isz}$$

Table C1: Attrition: Difference in attrition rates in treatment and spillover vs. control groups

	STEM sample		TVET sample		
	(1) 1st Follow-up Survey	(2) Test Score Data	(3) 1st Follow-up Survey	(4) 2nd Follow-up Survey	(5) Test Score Data
Treatment	0.011	0.009	0.004	-0.006	0.013
	(0.008)	(0.006)	(0.009)	(0.024)	(0.011)
Spillover	0.020*	0.006	0.006	-0.018	0.013
	(0.012)	(0.004)	(0.006)	(0.018)	(0.009)
Observations	6458	6458	5540	5540	5540
R-squared	0.009	0.005	0.005	0.005	0.008
Control Mean	0.032	0.022	0.017	0.151	0.015
p-value (TREAT)-(SPILL)=0	0.328	0.713	0.838	0.532	0.965

Notes: Difference in attrition probability in treatment and spillover versus control groups, estimated with an OLS regression of the attrition dummy on the treatment and spillover dummies and strata fixed effects. Standard errors clustered at the school level. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Next, we examine whether attrition students are different in terms of baseline values of primary and intermediate outcome variables (Tables C2 and C3).

$$y_{isz0} = \beta_0 + \beta_1 \text{attrition}_{is} + \delta_z + \epsilon_{isz}$$

Finally, we evaluate whether the baseline characteristics of attrition students in the treatment and spillover groups are significantly different from those in the control group. For this analysis,

Table C2: Attrition: Baseline difference between attriters and non-attriters, grade 10 sample

	Obs.	Non-Attriters	Attriters – Non-Attriters	
			Mean	p-value
	(1)	(2)	(3)	(4)
Panel A: Primary Outcomes				
Science as top 1 choice after grade 10 (dummy)	6458	0.37	-0.06	0.04
Panel B: Intermediate Outcomes				
STEM-related college majors as top 2 choice after grade 12 (dummy)	6458	0.75	-0.08	0.02
Interest in math index	6430	0.01	-0.23	0.00
Interest in science subjects index	6451	0.01	-0.25	0.00
Interest in studying overall index	6116	0.02	-0.17	0.06
Attitude to science and technology index	6442	0.02	-0.19	0.01
Bias against women in STEM index	6451	-0.02	0.07	0.43
Subjective knowledge on science stream index	6345	-0.01	-0.14	0.04
Expected satisfaction on science stream index	6309	-0.02	0.07	0.23
Approval index if choosing science	6397	-0.00	-0.10	0.13
Belief index about peers' preference in science	6119	-0.03	-0.15	0.01
Subjective assessment to enroll and complete science stream index	6383	-0.02	-0.02	0.73

Notes: Column (1) reports the number of observations for each variable. Column (2) presents the mean among non-attriters. Column (3) shows the mean difference between attriters and non-attriters, controlling for strata fixed effects and using cluster-robust standard errors at the school level. The corresponding p-value is reported in Column (4).

Table C3: Attrition: Baseline difference between attriters and non-attriters, grade 12 sample

	Obs.	Non-Attriters	Attriters – Non-Attriters	
			Mean	p-value
	(1)	(2)	(3)	(4)
Panel A: Primary Outcomes				
TVET as top 3 choice after grade 12 genuine interest (dummy)	5540	0.21	0.05	0.24
TVET as top 3 choice after grade 12 if decide today (dummy)	5540	0.18	0.07	0.10
Panel B: Intermediate Outcomes				
Bias against blue-collar jobs index	5303	0.02	0.08	0.48
Attitude to science and technology index	5515	-0.01	-0.04	0.78
Bias against women in TVET index	5161	0.03	0.24	0.03
Subjective knowledge on TVET index	5415	0.03	0.02	0.87
Expected satisfaction on TVET index	5022	0.00	0.00	0.99
Approval index if choosing TVET	4708	0.01	0.05	0.60
Belief index about peers' preference in TVET	5185	0.02	0.00	.
Subjective assessment to enroll and complete TVET index	4988	-0.03	0.07	0.56
Belief on own employment (%) with TVET degree	4878	46.01	2.67	0.17
Belief on own earnings (Nu 000) with TVET degree	5208	22.15	1.24	0.54

Notes: Column (1) reports the number of observations for each variable. Column (2) presents the mean among non-attriters. Column (3) shows the mean difference between attriters and non-attriters, controlling for strata fixed effects and using cluster-robust standard errors at the school level. The corresponding p-value is reported in Column (4).

the sample is restricted to attrition students.

$$(y_{isz0}|\text{attrition}_{isz} = 1) = \beta_0 + \beta_1\text{TREAT}_{is} + \beta_2\text{SPILL}_{is} + \delta_z + \epsilon_{isz}$$

In all analyses, standard errors are clustered at the school level.

Table C4: Attrition: Baseline difference between treatment and spillover attriters vs. control attriters, grade 10 sample

	Obs.	Control	Treat – Control		Spill – Control	
			Mean	p-value	Mean	p-value
	(1)	(2)	(3)	(4)	(5)	(6)
Panel A: Primary Outcomes						
Science as top 1 choice after grade 10 (dummy)	269	0.30	0.03	0.69	0.07	0.29
Panel B: Intermediate Outcomes						
STEM-related college majors as top 2 choice after grade 12 (dummy)	269	0.64	0.05	0.63	0.06	0.39
Interest in math index	269	-0.15	-0.24	0.32	-0.10	0.50
Interest in science subjects index	269	-0.43	0.12	0.59	0.25	0.09
Interest in studying overall index	249	-0.43	0.18	0.42	0.32	0.04
Attitude to science and technology index	269	-0.25	0.15	0.47	0.11	0.43
Bias against women in STEM index	269	0.09	0.09	0.67	-0.16	0.32
Subjective knowledge on science stream index	267	-0.18	-0.05	0.82	-0.01	0.94
Expected satisfaction on science stream index	265	0.02	-0.10	0.68	-0.04	0.74
Approval index if choosing science	264	-0.11	0.18	0.37	-0.09	0.46
Belief index about peers' preference in science	256	-0.18	-0.25	0.09	0.06	0.64
Subjective assessment to enroll and complete science stream index	263	-0.09	0.03	0.89	-0.07	0.59

Notes: Column (1) reports the number of observations for each variable. Column (2) presents the mean for attriters in the control group. Column (3) shows the mean difference between attriters in the treatment and control groups, controlling for strata fixed effects and using cluster-robust standard errors at the school level; the corresponding p-value is reported in Column (4). Column (5) reports the mean difference between attriters in the spillover and control groups, also controlling for strata fixed effects with cluster-robust standard errors at the school level; the corresponding p-value is reported in Column (6).

Throughout these analyses, we find minimal evidence of significant differences in attrition rates between the treatment and control groups. In the grade 10 student sample, we observe some differences between attriters and non-attriters, but no such differences emerge in the grade 12 sample. Additionally, among grade 10 attriters, there is virtually no variation in baseline outcome variables across the treatment, spillover, and control groups. However, in the grade 12 sample, there are some differences in educational preferences, biases against blue-collar jobs, and expected satisfaction with studying TVET. To account for attrition, we report bounds on treatment effects

Table C5: Attrition: Baseline difference between treatment and spillover attriters vs. control attriters, grade 12 sample

	Obs.	Control	Treat – Control		Spill – Control	
			Mean	p-value	Mean	p-value
	(1)	(2)	(3)	(4)	(5)	(6)
Panel A: Primary Outcomes						
TVET as top 3 choice after grade 12 genuine interest (dummy)	107	0.35	-0.18	0.18	-0.22	0.02
TVET as top 3 choice after grade 12 if decide today (dummy)	107	0.30	-0.15	0.32	-0.10	0.32
Panel B: Intermediate Outcomes						
Bias against blue-collar jobs index	104	0.19	0.21	0.28	-0.37	0.06
Attitude to science and technology index	107	-0.05	-0.37	0.16	0.01	0.96
Bias against women in TVET index	100	0.38	-0.24	0.43	-0.19	0.38
Subjective knowledge on TVET index	105	0.15	-0.07	0.82	-0.16	0.46
Expected satisfaction on TVET index	98	0.18	-0.47	0.15	-0.39	0.03
Approval index if choosing TVET	87	0.03	-0.61	0.02	0.14	0.32
Subjective assessment to enroll and complete TVET index	102	0.32	-0.74	0.14	-0.44	0.06
Belief on own employment (%) with TVET degree	88	50.42	-9.34	0.07	-4.77	0.19
Belief on own earnings (Nu 000) with TVET degree	103	24.15	-6.93	0.19	-2.47	0.49

Notes: Column (1) reports the number of observations for each variable. Column (2) presents the mean for attriters in the control group. Column (3) shows the mean difference between attriters in the treatment and control groups, controlling for strata fixed effects and using cluster-robust standard errors at the school level; the corresponding p-value is reported in Column (4). Column (5) reports the mean difference between attriters in the spillover and control groups, also controlling for strata fixed effects with cluster-robust standard errors at the school level; the corresponding p-value is reported in Column (6).

using the bounding method proposed by Lee (2009).

Table C6: Lee bounds for treatment effects on stated preference outcomes

	Obs.	Lower bound	Upper bound
	(1)	(2)	(3)
Grade 10 sample			
Science as top 1 choice after grade 10 (dummy)	6189	0.137***	0.143***
		(0.020)	(0.020)
Grade 12 sample			
TVET as top 3 choice after grade 12 genuine interest (dummy)	5433	0.055***	0.058***
		(0.018)	(0.019)
TVET as top 3 choice after grade 12 if decide today (dummy)	5433	0.034**	0.036**
		(0.017)	(0.018)

Notes: Lee treatment effect bounds for sample selection. Column (1) shows the number of observations for each variable. Column (2) reports the lower bound. Column (3) reports the upper bound. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

D Mentor Recruitment and Training Guidelines

D1 Recruitment of STEM Mentors

Vacancy Announcement for Mentors from Colleges under RUB/KGUMSB

The Ministry of Education (MoE) with the support of the Asian Development Bank (ADB) is currently piloting a career mentoring program for about 2,000 students in grades IX to X. The objective of the program is to increase the enrollment of students in the Science stream after they complete their secondary school. The students will be encouraged to take part in learning the contents of Science, Technology, Engineering, and Math (STEM) related subjects.

In order to conduct the program, MoE intends to select 200 mentors from all colleges with STEM majors under RUB and KGUMSB and some recent graduates. The selected mentors will be trained by Counsellors under MoE for about five days tentatively from 16-20 September 2021.

Job Description

The mentors will provide advice and guidance to grade IX and X students (mentees) to support their progression and achievement of those students. This may include academic and/or pastoral issues and may require an awareness of and liaison with additional student support services provided by the schools. Most importantly, the grade IX and X students should grow their interest in pursuing STEM subjects. The mentors should let the mentees strive and compete with each other to book their places in STEM schools, technical and vocational education and training, and colleges.

Mentors will communicate with mentees on a one-to-one basis, to discuss with them their plans after completing secondary school and to provide tutoring. The session could be in person or online. Apart from official meetings, mentors and mentees are encouraged to communicate frequently using other means of communication such as social media or text messages.

Main Responsibilities

- To communicate with mentees on a one-to-one basis, at least 4 times (1 hour per session) in September and October to discuss with them their plans after completing secondary school.
- To give live information and a clearer understanding of “STEM campus life.”

- To provide provision of subject-based knowledge support for mentees that meet their specific needs of the program. This support may be made available through individual or group-based mentoring sessions.
- To identify when a student may be experiencing difficulties and develop a plan to support the student who is in need.
- To provide constructive feedback and extract the best qualities out of the mentees.
- To organize and deliver advice and resources to mentees that help them achieve their educational, professional, and/or personal goals.

Eligibility Criteria

- The students applying for mentors should be pursuing a bachelor's/master's program in STEM subject.
- They should be able to provide mentoring and able to address academic questions in core subjects (Math, Physics, Chemistry, and Biology) of grade IX level.
- They should have secured a minimum of 65 percent in overall academic performance in grade XII.
- They should have experience in dealing with difficult, sensitive, or unexpected situations.
- They should have excellent communication skills.
- They should have the ability to listen and to initiate contact with other students confidently.

Remuneration

As a token of appreciation for the time and effort, each mentor will be provided a lump sum amount of Nu 6,000 (Ngultrum Six Thousand Only) after fulfilling all the required tasks. Other incidental costs related to travel, phone calls, and internet data will be reimbursed.

How to Apply

Please submit the latest CV and a copy of the grade XII academic marksheet to "Email Address [Retracted]" by 31 August 2021. All eligible mentors will receive an online survey link as part of the recruitment process.

The announcement of the selected mentors will be made by the respective college administration on or before 7 September 2021.

Summary characteristics of the mentor sample are reported below.

Table D1: Characteristics of Grade 10 Mentors

	Mean	SD	Min	Max	N
Age	22.11	2.24	18.00	36.00	200.00
Male	0.58	0.49	0.00	1.00	200.00
Year in college	2.78	0.83	1.00	5.00	188.00
Big 5 Extroversion	3.33	0.66	0.50	5.00	193.00
Big 5 Agreeness	3.79	0.50	2.67	5.00	193.00
Big 5 Conscientiousness	3.83	0.54	2.33	4.67	193.00
Big 5 Neuroticism	2.29	0.67	0.67	4.33	193.00
Big 5 Openness	4.20	0.51	2.67	5.00	193.00

D2 Recruitment of TVET Mentors

Vacancy Announcement for Mentors from TTIs

The Ministry of Education (MoE) with the support of the Asian Development Bank (ADB) is currently piloting a career mentoring program for about 2,000 students in grades XI to XII. The goal is to encourage the right persons to enroll in technical and vocational education and training (TVET) institutes after school graduation.

To conduct the program, MoE intends to select 200 mentors from all TTIs and recent TTI graduates. The selected mentors will be trained by Counsellors under MoE for about five days tentatively from 16-20 September 2021.

Job Description

The mentors will provide advice and guidance to grade XI and XII students (mentees) to support their progression and achievement of those students. This may include academic and/or pastoral issues and may require an awareness of and liaison with additional student support services provided by the schools. Most importantly, the grade XI and XII students should grow their interest in pursuing the TVET courses.

Mentors will communicate with mentees on a one-to-one basis, to discuss with them their plans after completing secondary school. The session could be in person or online. Apart from official meetings, mentors and mentees are encouraged to communicate frequently using other means of communication such as social media or text messages.

Main Responsibilities

- To communicate with mentees on a one-to-one basis, at least 4 times (1 hour per session) to discuss with them their plans after completing secondary school and TVET education opportunities.
- To give live information and a clearer understanding of "TVET student life."
- To identify when a student may be experiencing difficulties and develop a plan to support the student who is in need.
- To provide constructive feedback and extract the best qualities out of the mentees.
- To organize and deliver advice and resources to mentees that help them achieve their educational, professional, and/or personal goals.
- To accompany mentees for TVET school and Industry visits.

Eligibility Criteria

- The students applying for mentors should be TVET students, or domestic/overseas workers who graduated from TVET.
- They should be able to provide mentoring to Grade XI and XII students.
- They should have experience in dealing with difficult, sensitive, or unexpected situations.
- They should have excellent communication skills.
- They should have the ability to listen and to initiate contact with other students confidently.

Remuneration

As a token of appreciation for the time and effort, each mentor will be provided a lump sum amount of Nu

6,000 (Ngultrum Six Thousand Only) after fulfilling all the required tasks. Other incidental costs related to travel, phone calls, and internet data will be reimbursed.

How to Apply

Please submit the latest CV and a copy of the grade X academic marksheet to "Email Address [Retracted]" by 31 August 2021. All eligible mentors will receive an online survey link as part of the recruitment process. The announcement of the selected mentors will be made by the respective college administration on or before 7 September 2021.

Summary characteristics of the mentor sample are reported below.

Table D2: Characteristics of Grade 12 Mentors

	Mean	SD	Min	Max	N
Age	22.72	2.43	18.00	30.00	138.00
Male	0.74	0.44	0.00	1.00	140.00
Big 5 Extroversion	2.98	0.53	1.00	4.33	103.00
Big 5 Agreeness	3.70	0.56	2.67	4.67	103.00
Big 5 Conscientiousness	3.71	0.53	2.33	4.67	103.00
Big 5 Neuroticism	2.45	0.67	0.67	3.67	103.00
Big 5 Openness	4.03	0.55	3.00	5.00	103.00

D3 The Career Mentoring Code of Conduct

In consultation with government officials and relevant stakeholders, the mentoring program was conducted such that mentors and mentees of different genders could be paired together. As a result, mentors were required to undergo a training session in which codes of conduct were introduced and discussed.

The Career Mentoring Code of Conduct

The mentors are required to uphold and practice the following with integrity during the Career Mentoring that they provide to the mentees:

1. Do No Harm – physically or psychologically.
2. Mentors are responsible for setting and keeping appropriate boundaries that govern supportive interactions with mentees
3. Mentors should be positive role models and advocates of TVET/STEM. They are to advocate the TVET/STEM Education and not impose their agendas on the mentees.
4. Mentors should maintain cordial and professional relationships with the mentees and avoid exploitation in any way.
5. Mentors should not engage in romantic relationships with any mentee.
6. Mentors should maintain confidentiality, objectivity, and equal partnership.
7. Mentors should consult the School Guidance Counsellor if there is any concern.

D4 Labor Market Information

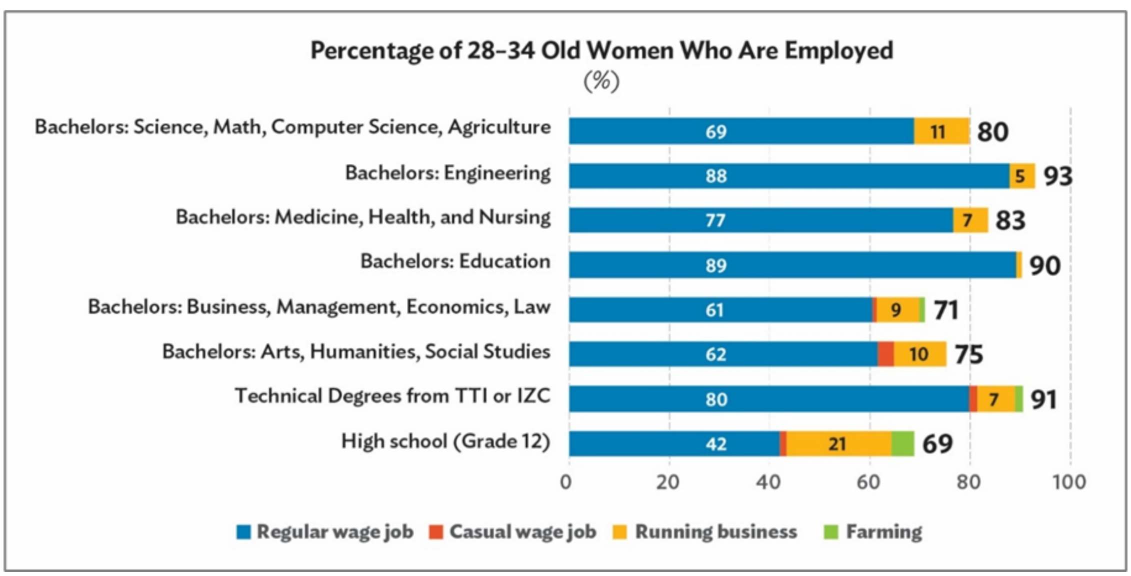
During the training, mentors were provided with leaflets containing information on the labor market outcomes of 28-34-year-olds, in terms of job types, earnings, and employment rates, disaggregated by gender and field of study. These statistics were calculated by the research team using the Labor Force Surveys 2018 and 2019, which were conducted by the National Statistics Bureau of Bhutan.

D4.1 Labor Market Information of Female Workers Aged 28-34

– Types of Jobs –

The graph shows what percentage of 28–34-year-old women are employed by job type. For example,

- Of the women who received Bachelors in Science, Math, Computer Science, and Agriculture: 69 percent work for regular wage jobs, 0 percent work for casual wage jobs, 11 percent run businesses, and 2 percent run farms. In total 80 percent are employed.
- Of the women who received technical degrees from Technical Training Institute (TTI) or Institute of Zorig Chusum (IZC): 80 percent work for regular wage jobs, 2 percent work for casual wage jobs, 7 percent run businesses, and 2 percent run farms. In total 91 percent are employed.

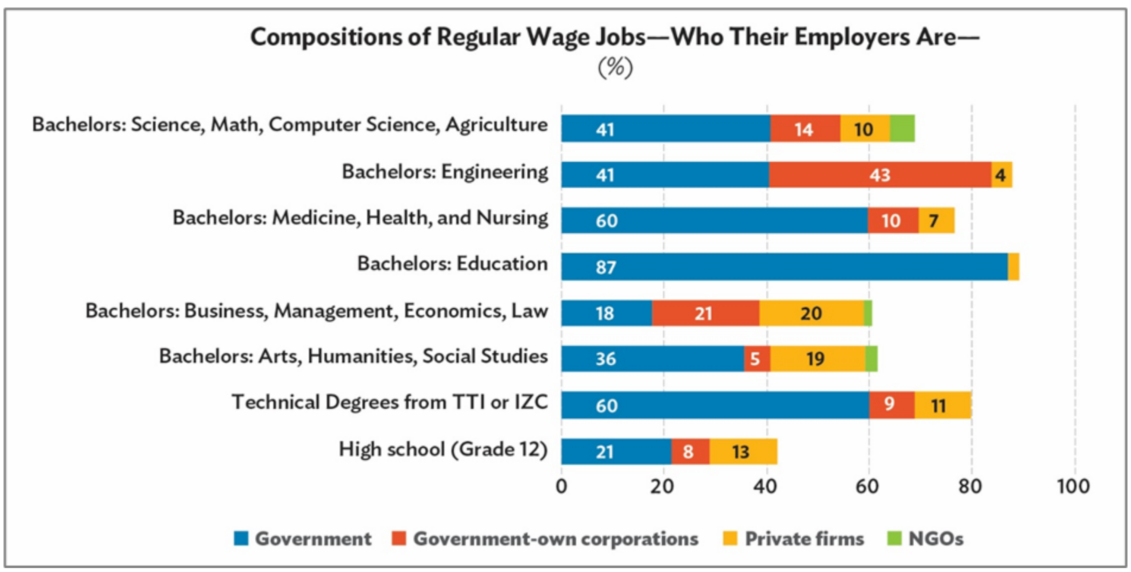


– Types of Employers of Regular Wage Workers –

Among 28–34-year-old women, the graph shows what percentage of people work for regular wage jobs in the government, government-owned corporations, private firms, and non-governmental organizations (NGOs). For example,

- Of the 28–34-year-old women who received a Bachelor in Engineering: 41 percent work for regular wage jobs in the government, 43 percent work for regular wage jobs in government-owned corporations, 4 percent work for regular wage jobs in private firms, and 0 percent work for regular wage jobs in NGOs.

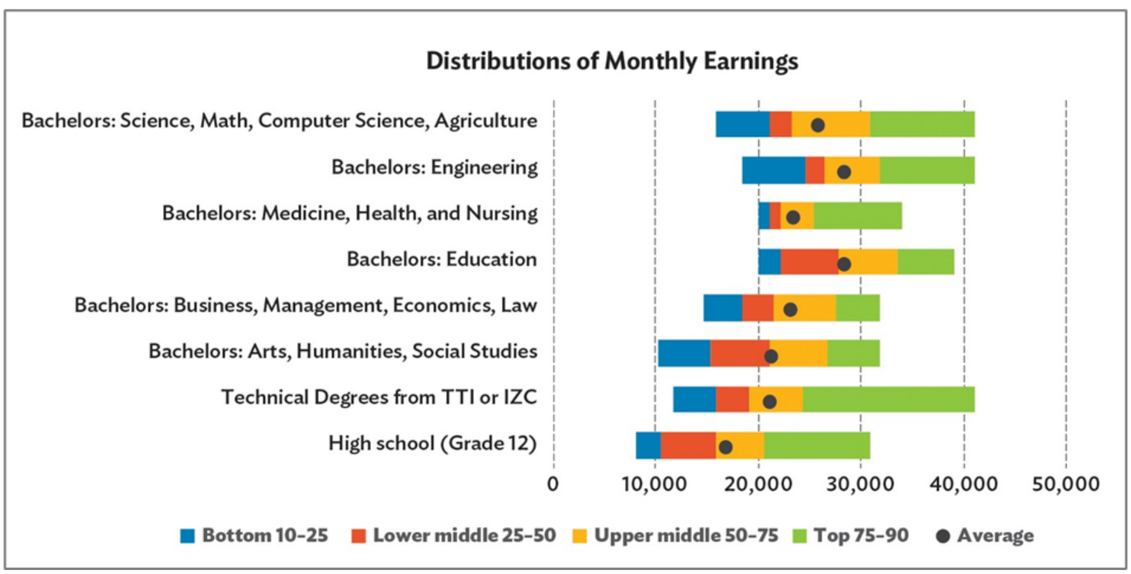
- Of the 28–34-year-old women who received Bachelors in Arts, Humanities, and Social Studies: 36 percent work for regular wage jobs in the government, 5 percent work for regular wage jobs in government-owned corporations, 19 percent work for regular wage jobs in private firms, and 2 percent work for regular wage jobs in NGOs.



– How Much Women Earn –

The graph shows the monthly earnings of employed women aged 28–34 years. For example,

- Among employed women aged 28–34 who received a Bachelor's Degree in Education:
  - Bottom 10-25 percent of people earn Nu 20,000 to Nu 22,500 monthly.
  - Lower middle 25-50 percent earn Nu 22,500 to Nu 28,000.
  - Upper middle 50-75 percent earn Nu 28,000 to Nu 33,500.
  - Top 75-90 percent earn Nu 33,500 to Nu 39,000.
  - The average monthly earnings are Nu 28,500.
- Among employed women aged 28–34 who stopped education after grade 12:
  - Bottom 10-25 percent of people earn Nu 8,000 to Nu 10,500 monthly.
  - Lower middle 25-50 percent earn Nu 10,500 to Nu 16,000.
  - Upper middle 50-75 percent earn Nu 16,000 to Nu 20,500.
  - Top 75-90 percent earn Nu 20,500 to Nu 31,000.
  - The average monthly earnings are Nu 17,000.



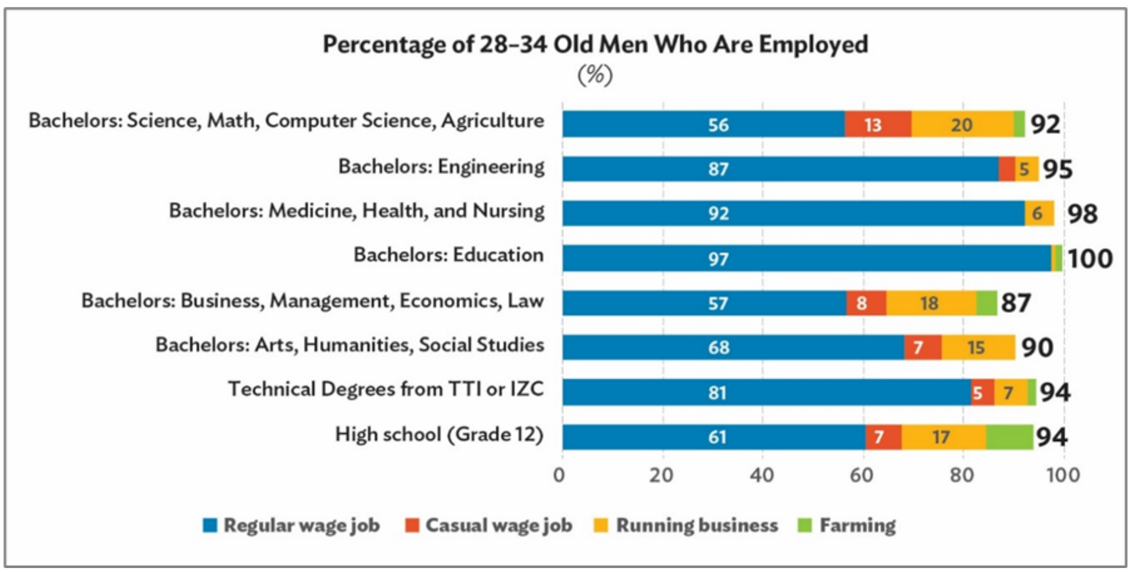
D4.2 Labor Market Information of Male Workers Aged 28-34

– Types of Jobs –

The graph shows what percentage of 28–34-year-old men are employed by job type. For example,

- Of the men who received Bachelors in Science, Math, Computer Science, and Agriculture: 56 percent work for regular wage jobs, 13 percent work for casual wage jobs, 20 percent run businesses, and 2 percent run farms. In total 92 percent are employed.

- Of the men who received technical degrees from Technical Training Institute (TTI) or Institute of Zorig Chusum (IZC): 81 percent work for regular wage jobs, 5 percent work for casual wage jobs, 7 percent run businesses, and 2 percent run farms. In total 94 percent are employed.

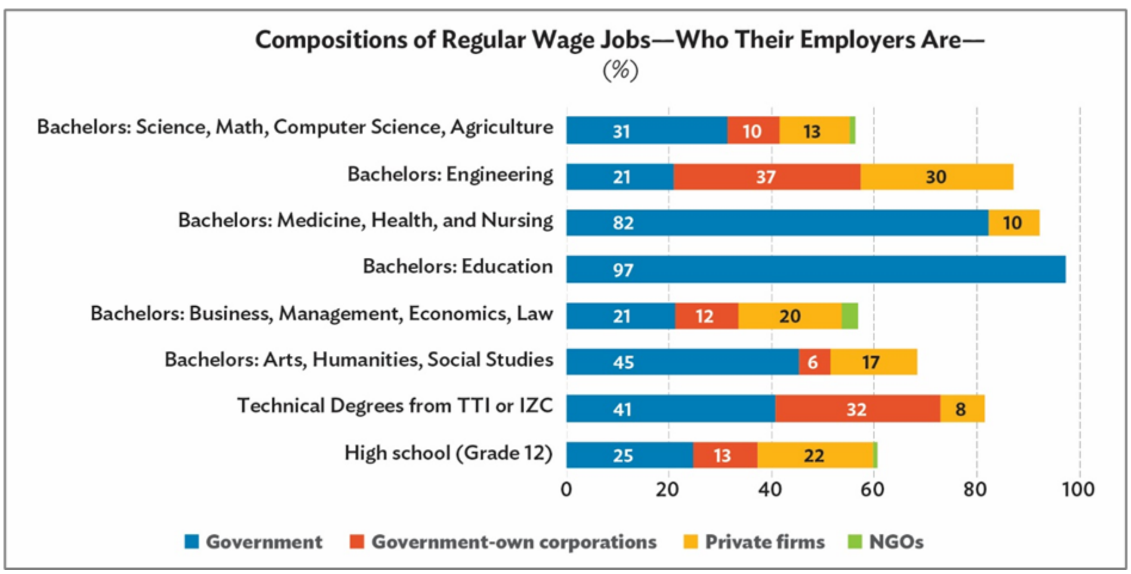


– Types of Employers of Regular Wage Workers –

3 Among 28–34-year-old men, the graph shows what percentage of people work for regular wage jobs in the government, government-owned corporations, private firms, and non-governmental organizations (NGOs). For example,

- Of the 28–34 year-old men who received Bachelors in Engineering: 21 percent work for regular wage jobs in the government, 37 percent work for regular wage jobs in government-owned corporations, 30 percent work for regular wage jobs in private firms, and 0 percent work for regular wage jobs in NGOs.

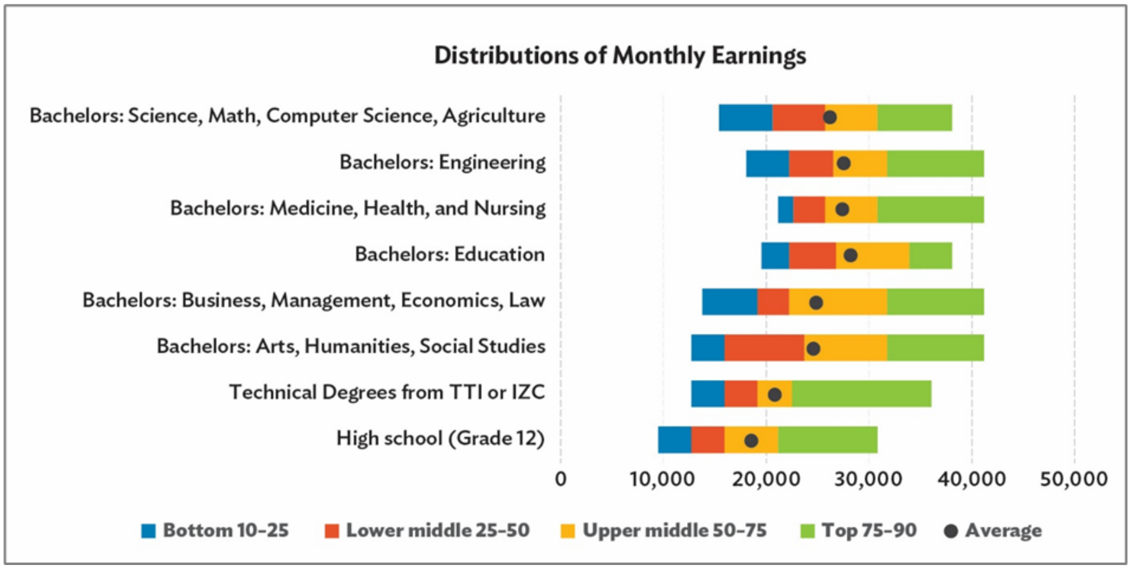
- Of the 28–34-year-old men who received Bachelors in Arts, Humanities, and Social Studies: 45 percent work for regular wage jobs in the government, 6 percent work for regular wage jobs in government-owned corporations, 17 percent work for regular wage jobs in private firms, and 0 percent work for regular wage jobs in NGOs.



– How Much Men Earn –

The graph shows the monthly earnings of employed men aged 28–34 years. For example,

- Among employed men aged 28–34 who received a Bachelor's Degree in Education:
  - Bottom 10-25 percent of people earn Nu 19,500 to Nu 22,500 monthly.
  - Lower middle 25-50 percent earn Nu 22,500 to Nu 27,000.
  - Upper middle 50-75 percent earn Nu 27,000 to Nu 34,000.
  - Top 75-90 percent earn Nu 34,000 to Nu 38,000.
  - The average monthly earnings are Nu 28,000.
- Among employed men aged 28–34 who stopped education after grade 12:
  - Bottom 10-25 percent of people earn Nu 9,500 to Nu 12,500.
  - Lower middle 25-50 percent earn Nu 12,500 to Nu 16,000.
  - Upper middle 50-75 percent earn Nu 16,000 to Nu 21,000.
  - Top 75-90 percent earn Nu 21,000 to Nu 31,000.
  - The average monthly earnings are Nu 18,500.



D5 The Training Programs for Mentors

D5.1 STEM Mentors

There are two training programs:

- Program 2A for the School Guidance Counselors (SGCs)
- Program 2B for the Student Mentors (SMs).

Program 2A: Training of the SGCs : This is a three-day training program for the SGCs. The objectives of this training are:

- To enable the SGCs to equip the student mentors (SMs) with appropriate knowledge, skills, and perception to create awareness of STEM Education in Grade IX-X students so that the selected students would take up STEM subjects in their higher education after the completion of middle secondary school.
- The SGCs understand the content, structure, and delivery of Program 2B
- The SGCs can create awareness of STEM Education through their Career Education Program in their schools and communities.

Program 2A: Course Content, Structure and Delivery

Content	Structure	Delivery
1. Career Mentoring - Process - Skills 2. STEM Education Project 3.Facilitation skills - Effective Communication - Interpersonal Skills - Effective presentation - Purposeful Energizers 4. Leadership Skills 5. Code of Conduct-Mentor-Mentee Relationship (intension & service) 6. Record keeping 7. Consultation	• 3-day program, 9AM to 5PM • Handouts • Course Materials	• Interactive and collaborative • Trainer presentations and discussions • Frequent use of creative learner-directed activities, such as small-group and partner- to-partner interactions and purposeful energizers • The day will begin with mindfulness practice and end with reflections • Periodic reviews to enhance retention • Learning assessment exercises. • The participants (SGCs) are adult learners, and they have prior knowledge and experiences. The delivery should be based on the following principles: - Focus on real-world problems - Emphasize how the information can be applied - Relate the information to participants' goals - Relate the materials to participants' experiences - Allow debate of and challenge to ideas - Listen to and respect the opinions of participants - Encourage the participants to be resources for the trainer and for one another - Treat participants with respect

Note:

- The day will begin with 1 minute of mindfulness practice and end with reflection of the day's learning.
- An officer of the day (OD) will be selected on voluntary basis, from the participants, to help with the proceedings of the.

Program 2A: Topics, Trainers & Sessions

Sl.#	Topic	Trainer	Sessions
1	Career Mentoring - Process - Skills	Nidup Gyaltshen Naina Kala Gurung	2
2	STEM Education Project	STEM Focal Person	1
3	Facilitation skills - Effective Communication - Interpersonal Skills - Effective presentation - Purposeful Energizers	Nidup Gyaltshen Naina Kala Gurung	3
4	Leadership Skills	Nidup Gyaltshen Naina Kala Gurung	1
5	Code of Conduct	Nidup Gyaltshen Naina Kala Gurung	1
6	Record Keeping	Nidup Gyaltshen Naina Kala Gurung	1
7	Consultation	Nidup Gyaltshen Naina Kala Gurung	1
	Opening, Closure & Skills Presentations	Nidup Gyaltshen Naina Kala Gurung	2
			12

Program 2A: Overview

Day	Topics	Trainer
Day 1	Introduction to the Program STEM Education Project Career Mentoring - Process - Skills	Nidup Gyaltshen Naina Kala Gurung STEM Focal Person
Day 2	Facilitation skills - Effective Communication - Interpersonal Skills - Effective presentation - Purposeful Energizers Leadership Skills	Nidup Gyaltshen Naina Kala Gurung
Day 3	Code of Conduct Consultation Career Mentoring Plan Presentation (Learning Partner Exercise)	Nidup Gyaltshen Naina Kala Gurung

Program 2A: Daily Schedule

Day	Session 1	Session 2	Session 3	Session 4
Day 1	Introduction to the Program Self-Introductions Expectations Career Mentoring	STEM Education	Career Mentoring - Process - Skills	Career Mentoring - Process - Skills
Day 2	Facilitation skills - Effective Communication - Interpersonal Skills	Facilitation skills - Effective presentation - Purposeful Energizers	Leadership Skills	Leadership Skills
Day 3	Code of Conduct	Consultation Record Keeping	Career Mentoring Plan Presentation (Learning Partner Exercise)	Career Mentoring Plan Presentation (Learning Partner Exercise) **Closure**

Program 2B: Training of the Student Mentors : This is a two-day training program, followed by two hours of supplementary training for three consecutive days, and which will be conducted after the day's class of the Student Mentors (SMs). The SGCs trained in Program 2A will facilitate this training program. The objectives of this training are:

- The SMs learn appropriate knowledge, skills, and perceptions to create STEM Education awareness in schools and their communities
- SMs can articulate the importance of STEM Education, STEM Life, STEM Courses, Career Path, Entry Requirements, and Application Process
- The SMs become more proficient in Career Mentoring and facilitation skills

Program 2B: Course Content, Structure, and Delivery

Content	Structure	Delivery
1.Career Mentoring - Process - Skills 2. STEM Education - Importance of STEM - STEM Life - STEM Courses - LMI - STEM Career Path - Entry Requirements - Application Process 3.Facilitation skills - Effective Communication - Interpersonal Skills - Effective presentation 4. Leadership Skills 5. Code of Conduct-Mentor-Mentee Relationship 6. Record keeping 7. Consultation	• 2-day program, (9AM to 6PM) followed by 6 hours of supplementary training • Handouts • Course Materials	• Interactive and collaborative • Trainer-led presentations and discussions • Frequent use of creative learner-directed activities, such as small-group and partner- to-partner interactions and purposeful energizers • The day will begin with mindfulness practice and end with reflections • Periodic reviews to enhance retention • Learning assessment exercises. • The Student Mentors are early adult learners, and they have prior knowledge and experiences. The delivery should be based on the following principles: - Focus on real-world problems - Emphasize how the information can be applied - Relate the information to participants' goals - Relate the materials to participants' experiences - Allow debate of and challenge to ideas - Listen to and respect the opinions of participants - Encourage the participants to be resources for the trainer and for one another - Treat participants with respect

Note:

- The day will begin with 1 minute of mindfulness practice and end with reflection of day's learning.
- An officer of the day (OD) will be selected on voluntary basis, from the participants, to help with the proceedings of the day.

Program 2B: Overview

Day	Topics	Trainer
Day 1	Program Introduction Individual Introductions Career Mentoring STEM Education - Importance of STEM - STEM Courses, - STEM Life - LMI - STEM Career Path Facilitation Skills	SGCs Focal Person, MoLHR Principal, VTI
Day 2	STEM Entry Requirement STEM Admission Process Facilitation skills Leadership Skills Skills Practice	Focal Person, MoLHR Principal, VTI SGCs
6 Hours of Supplementary Training for 3 consecutive days(2x3)	- Code of Conduct - Consultation - The Four Meetings - Record Keeping - Career Mentoring Plan Presentation	SGCs

Program 2B: Topics, Trainers & Sessions for the two-day training

Sl.#	Topic	Trainer	Number of Sessions
1	Career Mentoring - Process - Skills	School Guidance Counsellors	1
2	STEM Education - Importance of STEM - STEM Life - STEM Courses - LMI - Career Path - Entry Requirements - Application Process	Principal, VTI, MoLHR	3
3	Facilitation skills - Effective Communication - Interpersonal Skills - Effective presentation	School Guidance Counsellors	2
4	Leadership Skills	SGCs	2
			8

Program 2B: Daily Schedule

Day	Session 1 *9:00-11:00	Session 2 *11:15-13:15	Session 3 *14:00-16:00	Session 4 *16:00-18:00
Day 1	Program Introduction Individual introductions Career Mentoring	STEM Education - Importance of STEM - STEM Courses	STEM Life STEM Career Path LMI	Facilitation skills
Day 2	STEM - Entry Requirement - Admission Process	Facilitation skills	Leadership Skills	Skill Practice Four Meetings

*The training is for 8 hours on each day. The beginning and the ending timings may vary depending on other factors, if any.

Program 2B: Supplementary Training

Hour/Day	Topic	Facilitator
First 2 Hours Day 3	• Code of Conduct • Consultation	SGCs
Second 2 Hours Day 4	• The Four Meetings • Record Keeping	SGCs
Third 2 Hours Day 5	Career Mentoring Plan Presentation	SGCs

D5.2 TVET Mentors

There are two training programs:

- Program 1A for the School Guidance Counselors (SGCs)
- Program 1B for the Student Mentors (SMs).

Program 1A: Training of the SGCs : This is a three-day training program for the SGCs. The objectives of this training are:

- To enable the SGCs to equip the student mentors (SM) with appropriate knowledge, skills, and perception to create awareness of TVET Education in Grade XI-XII students so that the selected high school students have a viable career option.
- The SGCs understand the content, structure, and delivery of Program 1B
- The SGCs can create awareness of TVET Education through their Career Education Program in their schools and communities.

Program 1A: Course Content, Structure, and Delivery

Content	Structure	Delivery
1. Career Mentoring - Process - Skills 2. TVET Education Project 3.Facilitation skills - Effective Communication - Interpersonal Skills - Effective presentation - Purposeful Energizers 4. Leadership Skills 5. Code of Conduct- Mentor-Mentee Relationship (intention & service) 6. Record keeping 7. Consultation	• 3-day program, 9AM to 5PM • Handouts • Course Materials	• Interactive and collaborative • Trainer presentations and discussions • Frequent use of creative learner-directed activities, such as small-group and partner- to-partner interactions and purposeful energizers • The day will begin with mindfulness practice and end with reflections • Periodic reviews to enhance retention • Learning assessment exercises. • The participants (SGCs) are adult learners, and they have prior knowledge and experiences. The delivery should be based on the following principles: - Focus on real-world problems - Emphasize how the information can be applied - Relate the information to participants' goals - Relate the materials to participants' experiences - Allow debate of and challenge to ideas - Listen to and respect the opinions of participants - Encourage the participants to be resources for the trainer and for one another - Treat participants with respect

Note:

- The day will begin with 1 minute of mindfulness practice and end with reflection.
- An officer of the day (OD) will be selected on voluntary basis, from the participants, to help with the proceedings of the day.

Program 1A: Topics, Trainers & Sessions

Sl.#	Topic	Trainer	Number of Sessions
1	Career Mentoring - Process - Skills	Nidup Gyaltshen Naina Kala Gurung	2
2	TVET Education	Focal Person, MoLHR	1
3	Facilitation skills - Effective Communication - Interpersonal Skills - Effective presentation - Purposeful Energizers	Nidup Gyaltshen Naina Kala Gurung	3
4	Leadership Skills	Nidup Gyaltshen Naina Kala Gurung	1
5	Code of Conduct	Nidup Gyaltshen Naina Kala Gurung	1
6	Record Keeping	Nidup Gyaltshen Naina Kala Gurung	1
7	Consultation	Nidup Gyaltshen Naina Kala Gurung	1
	Opening, Closure & Skills Presentation	Nidup Gyaltshen Naina Kala Gurung	2
			12

Program 1A: Overview

Day	Topics	Trainer
Day 1	Introduction to the Program TVET Education Project Career Mentoring - Process - Skills	Nidup Gyaltshen Naina Kala Gurung TVET Focal Person (MoLHR)
Day 2	Facilitation skills - Effective Communication - Interpersonal Skills - Effective presentation - Purposeful Energizers Leadership Skills	Nidup Gyaltshen Naina Kala Gurung
Day 3	Code of Conduct Consultation Record keeping Career Mentoring Plan Presentation (Learning Partner Exercise)	Nidup Gyaltshen Naina Kala Gurung

Program 1A: Daily Schedule

Day	Session 1	Session 2	Session 3	Session 4
Day 1	Introduction to the Program Self-Introductions Expectations	TVET Education Project	Career Mentoring - Process - Skills	Career Mentoring - Process - Skills
Day 2	Facilitation skills - Effective Communication - Interpersonal Skills	Facilitation skills - Effective presentation - Purposeful Energizers	Leadership Skills	Leadership Skills
Day 3	Code of Conduct	Consultation Record Keeping	Career Mentoring Plan Presentation (Learning Partner Exercise-Program 1B)	Career Mentoring Plan Presentation (Learning Partner Exercise-Program 1B) **Closure**

Program 1B: Training of the Student Mentors : This is a two-day training program, followed by two hours of supplementary training for three consecutive days, and which will be conducted after the day's class of the Student Mentors (SMs). The SGCs trained in Program 1A will facilitate this training program. The objectives of this training are:

- The SMs learn appropriate knowledge, skills, and perceptions to create TVET Education awareness in schools and their communities.
- SMs can articulate the importance of TVET Education, TVET Life, TVET Courses, LMI, Career Path, Entry Requirements, and Application Process
- The SMs learn the process of Career Mentoring and facilitation skills.

Program 1B for Student Mentors: Course Content, Structure and Delivery

Content	Structure	Delivery
1. Career Mentoring - Process - Skills 2. TVET Education - Importance of TVET - TVET Life - TVET Courses - LMI - TVET Career Path - Entry Requirements - Application Process 3.Facilitation skills - Effective Communication - Interpersonal Skills - Effective presentation 4. Leadership Skills 5. Code of Conduct – Mentor-Mentee Relationship (intentions & service) 6. Record keeping 7. Consultation	• 2-day program, (9AM to 6PM) followed by 6 hours of supplementary training • Handouts • Course Materials	• Interactive and collaborative • Trainer-led presentations and discussions • Frequent use of creative learner-directed activities, such as small-group and partner- to-partner interactions and purposeful energizers • The day will begin with mindfulness practice and end with reflections • Periodic reviews to enhance retention • Learning assessment exercises. • The student mentors are early adult learners, and they have prior knowledge and experiences. The delivery should be based on the following principles: - Focus on real-world problems - Emphasize how the information can be applied - Relate the information to student mentors' goals - Relate the materials to student mentors' experiences - Allow debate of and challenge to ideas - Listen to and respect the opinions of student mentors - Encourage student mentors to be resources for the trainer and for one another - Treat learners with respect.

Note:

- The day will begin with 1 minute of mindfulness practice and end with reflection of the day's learning.
- An officer of the day (OD) will be selected on voluntary basis, from the participants, to help with the proceedings of the day.

Program 1B: Overview

Day	Topics	Trainer
Day 1	Program Introduction Individual Introductions Career Mentoring TVET Education Project - Importance of TVET - TVET Courses, - TVET Life - LMI - TVET Career Path & Income Facilitation Skills	SGCs Focal Person, MoLHR Principal, VTI
Day 2	TVET Entry Requirement TVET Admission Process Facilitation skills Leadership Skills Skills Practice	Focal Person, MoLHR Principal, VTI SGCs
6 Hours of Supplementary Training for 3 consecutive days (2x3)	- Code of Conduct - Consultation - The Four Meetings - Record Keeping - Career Mentoring Plan Presentation	SGCs

Program 1B: Topics, Trainers & Sessions for the two-day training

Sl.#	Topic	Trainer	Number of Sessions
1	Career Mentoring - Process - Skills	School Guidance Counsellors	1
2	TVET Education - Importance of TVET - TVET Life - TVET Courses - LMI - Career Path - Entry Requirements - Application Process	Principal, VTI, MoLHR	3
3	Facilitation skills - Effective Communication - Interpersonal Skills - Effective presentation	School Guidance Counsellors	2
4	Leadership Skills	SGCs	2
			8

Program 1B: Daily Schedule

Day	Session 1 *9:00-11:00	Session 2 *11:15-13:15	Session 3 *14:00-16:00	Session 4 *16:00-18:00
Day 1	Program Introduction Individual introductions Career Mentoring	TVET Education - Importance of TVET - Courses	TVET Life TVET Career Path LMI	Facilitation skills
Day 2	TVET - Entry Requirement - Admission Process	Facilitation skills	Leadership Skills	Skill Practice Four Meetings

*The training is for 8 hours on each day. The beginning and the ending timings may vary depending on other factors, if any.

Program 1B: Supplementary Training

Hour/Day	Topic	Facilitator
First 2 Hours Day 3	• Code of Conduct • Consultation	SGCs
Second 2 Hours Day 4	• The Four Meetings • Record Keeping	SGCs
Third 2 Hours Day 5	Career Mentoring Plan Presentation	SGCs

D5.3 Venues for Mentors Training

SI. No.	Training Venue	Dzongkhag
1	IZC, Trashiyangtse	Trashi Yangtse
2	Technical Training Institute, Khuruthang	Punakha
3	Technical Training Institute, Samthang	Wangdue Phodrang
4	Technical Training Institute, Thimphu	Thimphu
5	IZC, Thimphu	Thimphu
6	College of Science and Technology	Chukha
7	Sherubtse College	Trashigang
8	Gyalpozhing College of Information Technology	Monggar
9	Jigme Namgyal Engineering College	Samdrup Jongkhar
10	College of Natural Resources	Punakha
11	Khesar Gyalpo University of Medical Sciences	Thimphu

D5.4 Colleges under RUB/KGUMSB with STEM Majors

SI. No.	Name of College	Dzongkhag	STEM Majors
1	College of Science and Technology	Chhukha	Bachelors in Engineering: Civil, Electrical, IT, Electronics, etc. Masters in Renewable Energy
2	Jigme Namgyel Engineering College	Samdrup Jongkhar	Bachelors in Engineering (Mechanical, Power, Surveying)
3	Royal Thimphu College		Bachelors in Nursing
4	Gyalpozhing College of Information & Technology	Monggar	Bachelors in Computer Science Computer Application and IT
5	Sherubtse College	Trashigang	Science, Computer Science and Math
6	College of Natural Resources	Punakha	Agriculture, Forestry, Animal Science, etc.
7	Paro College of Education	Paro	Bachelors in Education (Science)
8	Samtse College of Education	Samtse	Bachelors in Education (Science)
9	Faculty of Nursing	Thimphu	Nursing
10	Faculty of Postgraduate Medicine	Thimphu	Post graduate program in surgery, medicine, etc.

D5.5 List of TTIs and IZCs

SI. No.	Name of TTI/IZC	Dzongkhag	Course/Trade
1	TTI Chumey	Bumthang	Carpentry, Masonry, Furniture Making, Welding
2	TTI Khuruthang	Punakha	Electrical, Mechanical Welder, Mechanical Fitter
3	TTI Rangjung	Trashigang	Electrical, Automobile Mechanic, Computer Hardware Repair & Networking, Furniture Making, Cable TV Technician
4	TTI Samthang	Wangdue Phodrang	Automobile Mechanic, Automobile Electrical, Heavy Excavator Machine Operator, Heavy Vehicle Driving
5	TTI Thimphu	Thimphu	Automobile, Panel Beating, Auto Painting, Refrigerator and Air Conditioning
6	Jigme Wangchuk Power Training Institute	Sarpang	Mechanical Fitter, Wooden Furniture Maker, Carpentry and Masonry
7	IZC Thimphu	Thimphu	Embroidery, Painting, Sculpture, Carving, Ornament Making, Tailoring, Weaving, Embroidery, Blacksmith
8	IZC Trashi Yangtse	Trashi Yangtse	Embroidery, Painting, Sculpture, Carving, Wood Turning, Ornament Making, Tailoring
9	Royal Institute of Tourism and Hospitality	Thimphu	Diploma in Hotel Management and Tourism Management, Middle Management Training

E Components and Construction of Indexes

For each index below, we compute the simple average of responses corresponding to each component and standardize to have the mean of zero and the standard deviation of one.

E1 Attitude towards science and technology (Grades 10 and 12)

How much do you agree or disagree with the following statements?

1 = Strongly disagree

2 = Disagree

3 = Neither disagree nor agree

4 = Agree

5 = Strongly agree

(a) Science and technology are making our lives healthier, easier, and more comfortable.

(b) All things considered, science and technology make the world better off.

E2 Bias against females in STEMM and the labor force (Grade 10)

How much do you agree or disagree with the following statements?

1 = Strongly disagree

2 = Disagree

3 = Neither disagree nor agree

4 = Agree

5 = Strongly agree

(a) Science education is more important for a boy than for a girl.

(b) On average, men have higher ability in STEMM (science, technology, engineering, math, and medicine) than women.

(c) If women have STEMM (science, technology, engineering, math, and medicine)-related degrees and jobs, they suffer in their personal and social lives.

(d) STEMM-related jobs are for men than women.

(e) When jobs are scarce, men should have more rights to a job than women.

(f) When a mother works for pay, the children suffer.

E3 Bias against blue-collar jobs (Grade 12)

How much do you agree or disagree with the following statements?

1 = Strongly disagree

2 = Disagree

3 = Neither disagree nor agree

4 = Agree

5 = Strongly agree

(a) Blue-collar jobs are poorly perceived in society.

(b) Blue-collar jobs are inferior to white-collar jobs.

(c) Even with good pay, I wouldn't take blue-collar jobs.

(d) Blue-collar jobs are for men rather than women.

E4 Subjective knowledge of the field of study (Grades 10 and 12)

How much do you agree or disagree with the following statements?

1 = Strongly disagree

2 = Disagree

3 = Neither disagree nor agree

4 = Agree

5 = Strongly agree

For grade 10 students

(a) I know well about the admission/ enrollment criteria, curriculum, and the life of students of TTI

(b) I know well about future career paths after completing TTI

For grade 12 students

(a) I know well about the admission criteria for TVET education by Technical Training Institute (TTI) or Institute of Zorig Chusum (IZC)

(b) I know well about the application process for TVET education by the Technical Training Institute (TTI) or Institute of Zorig Chusum (IZC)

(c) I know well about the curriculum of TVET education by Technical Training Institute (TTI) or Institute of Zorig Chusum (IZC)

(d) I know well about the life of students at TVET education by Technical Training Institute (TTI) or Institute of Zorig Chusum (IZC)

(e) I know well about tuition and scholarship opportunities for TVET education by Technical Training Institute (TTI) or Institute of Zorig Chusum (IZC)

(f) I know well about the graduation rate of students at TVET education by Technical Training Institute (TTI) or Institute of Zorig Chusum (IZC)

(g) I know well about the future career paths and job prospects after graduation from TVET education by Technical Training Institute (TTI) or Institute of Zorig Chusum (IZC)

E5 Objective knowledge of the field of study (Grade 10)

Each correct answer gets one point, otherwise zero.

Which of the following statements is correct? To be eligible for admission in the Government higher secondary schools:

(a) Students must have been awarded with Pass Certificate in the BCSE examination

(b) Students must have been awarded with Pass Certificate in the BCSE examination and not enrolled in any private higher secondary schools (*** Correct Answer)

Which of the following statements is correct?

(a) All students are automatically considered for placement and admission to class XI.

(b) All students shall report to the Admission Centers to be considered for placement and admission to class XI. (*** Correct Answer)

Which of the following statements is correct regarding the entry requirement for the Science stream in the Government higher secondary schools?

(a) Students should have a minimum of 60 percent in Math, 40 percent in Science, and Grades B in all three Sciences.

(b) Students should have a minimum of 40 percent in Math, 55 percent in Science, and Grades C in all three Sciences. (*** Correct Answer)

(c) Students should have a minimum of 50 percent in Math, 30 percent in Science, and Grades C in all three Sciences.

(d) Students should have a minimum of 30 percent in Math, 55 percent in Science, and Grades B in all three Sciences.

When students have met the entry requirements for the Science stream in Government higher secondary schools, how would schools decide the merit order?

(a) The merit order listing will be based on Math only.

(b) The merit order listing will be based on the sum of Science and Math. (*** Correct Answer)

(c) The merit order listing will be based on the sum of Science, Math, and Dzongkha.

(d) The merit order listing will be based on the sum of Science, Math, and English.

E6 Objective knowledge of the field of study (Grade 12)

Each correct answer gets one point, otherwise zero.

Which of the following statements is correct? To be eligible for training programs in TTI or IZC:

(a) Students must be Bhutanese citizens and have completed class XII with a pass certificate

(b) Students must be Bhutanese citizens and have completed class X with a pass certificate (*** Correct Answer)

(c) Students can be of any nationality and must have completed class X with a pass certificate

(d) Students can be of any nationality and must have completed class XII with a pass certificate

Which of the following statements is correct?

(a) Students need to submit just one registration form (either online or hard copy) in order to apply for all TTIs/IZCs that they are interested in.

(b) Students need to submit one registration form for each TTI or IZC they are interested in. (*** Correct Answer)

When students are eligible for the training programs, based on which TTIs/IZC will shortlist the students for interview?

(a) Class X mark (*** Correct Answer)

(b) Class XII mark

(c) Health status

E7 Approvals of parents, friends, and society (Grade 10)

Parents' approval: How likely do you think that your parents would approve if you are enrolled in the Science stream in Grades XI-XII?

1 = Very unlikely

2 = Unlikely

3 = Possible

4 = Likely

5 = Very likely

Peer approval: How likely do you think that your friends would approve if you are enrolled in the Science stream in Grades XI-XII?

1 = Very unlikely

2 = Unlikely

3 = Possible

4 = Likely

5 = Very likely

Societal approval: How likely do you think that people in society in general would approve if you are enrolled in the Science stream in Grades XI-XII?

1 = Very unlikely

2 = Unlikely

3 = Possible

4 = Likely

5 = Very likely

E8 Approvals of parents, friends, and society (Grade 12)

Parents' approval: Imagine that you choose each of the options below. What do you think is the percent chance that your parents would approve of your choice of study?

(a) Bachelor's degree

(b) Technical degrees (National Certificate II, III, Diploma) from Technical Training Institute (TTI) or Institute of Zorig Chusum (IZC)

(c) Stop education after high school

Peer approval: Imagine that you choose each of the options below. What do you think is the percent chance that your parents would approve of your choice of study?

(a) Bachelor's degree

(b) Technical degrees (National Certificate II, III, Diploma) from Technical Training Institute (TTI) or Institute of Zorig Chusum (IZC)

(c) Stop education after high school

Societal approval: Imagine that you choose each of the options below. What do you think is the percent chance that your parents would approve of your choice of study?

(a) Bachelor's degree

(b) Technical degrees (National Certificate II, III, Diploma) from Technical Training Institute (TTI) or Institute of Zorig Chusum (IZC)

(c) Stop education after high school

E9 Beliefs about peers' preferences (Grades 10)

What percentage of the other secondary students do you believe choose each of the following degrees as their 1st choice?

(a) Arts stream, Grade XI-XII

(b) Commerce stream, Grade XI-XII

(c) Science stream, Grade XI-XII

(d) Rigzhung stream, Grade XI-XII

(e) TTI education after secondary school

(f) Stop education after secondary school

E10 Beliefs about peers' preferences (Grades 12)

What percentage of the other higher secondary students do you believe choose each of the following degrees as their 1st choice?

(a) Bachelors: Science, Math, Computer Science, Agriculture

(b) Bachelors: Engineering

(c) Bachelors: Medicine, Health, and Nursing

(d) Bachelors: Education

(e) Bachelors: Business, Management, Economics, and Law

(f) Bachelors: Arts, Humanities, and Social Studies

(g) Technical Degrees (National Certificate II, III, Diploma) from Technical Training Institute (TTI) or Institute of Zorig Chusum (IZC)

(h) Stop education after high school

E11 Expected satisfaction with the field of study (Grade 10)

How much do you think you would enjoy the following studies if you enroll in them

1 = Not at all

2 = Slightly

3 = Moderately

4 = Very much

5 = Extremely

(a) Arts stream, Grade XI-XII

(b) Commerce stream, Grade XI-XII

(c) Science stream, Grade XI-XII

(d) Rigzhung stream, Grade XI-XII

(e) TTI education after secondary school

E12 Expected satisfaction with the field of study (Grade 12)

How much do you think you would enjoy the curriculums and materials of the following studies if you enroll in them

1 = Not at all

2 = Slightly

3 = Moderately

4 = Very much

5 = Extremely

(a) Bachelor's degrees

(b) Technical degrees (National Certificate II, III, Diploma) from Technical Training Institute (TTI) or Institute of Zorig Chusum (IZC)

How much do you think you would enjoy the social and personal life during the following studies if you enroll in them

1 = Not at all

2 = Slightly

3 = Moderately

4 = Very much

5 = Extremely

(a) Bachelor's degrees

(b) Technical degrees (National Certificate II, III, Diploma) from Technical Training Institute (TTI) or Institute of Zorig Chusum (IZC)

E13 Beliefs about own ability to enroll and complete the study (Grade 10)

Based on your academic performance, how easy or difficult do you think would be for you to be enrolled in the Science stream in Grade XI-XII?

1 = Very difficult

2 = Quite difficult

3 = Moderate

4 = Quite easy

5 = Very easy

Based on your academic performance, how easy or difficult do you think would be for you to complete the Science stream in Grade XI-XII?

1 = Very difficult

2 = Quite difficult

3 = Moderate

4 = Quite easy

5 = Very easy

E14 Beliefs about own ability to enroll and complete the study (Grade 12)

Based on your academic performance, how easy or difficult do you think would be for you to be enrolled in the following studies?

1 = Very difficult

2 = Quite difficult

3 = Moderate

4 = Quite easy

5 = Very easy

(a) Bachelor's degrees

(b) Technical degrees (National Certificate II, III, Diploma) from Technical Training Institute (TTI) or Institute of Zorig Chusum (IZC)

Based on your academic performance, how easy or difficult do you think would be for you to complete the following studies?

1 = Very difficult

2 = Quite difficult

3 = Moderate

4 = Quite easy

5 = Very easy

(a) Bachelor's degrees

(b) Technical degrees (National Certificate II, III, Diploma) from Technical Training Institute (TTI) or Institute of Zorig Chusum (IZC)