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Implementing School–Enterprise Cooperation Policy in Higher Vocational Mechanical Engineering

A Case Study of Minxi Vocational and Technical College

WANGPEILIN[1], LIUJIANG[2], WULITING[3], LIGANGHUIYUN[4]

Minxi Vocational and Technical College – Associate Professor [1, 3]

Ulanqab Vocational College – Assistant Engineer in Environmental Protection [2]

Ph.D. Candidate in Educational Management at the Graduate University of Mongolia [1]

Ph.D. Candidate in Education at the Graduate University of Mongolia [2]

Ph.D. Student in Art Studies at the Graduate University of Mongolia [3, 4]

Corresponding Author: WANGPEILIN

ABSTRACT

In higher vocational mechanical engineering, cooperation policy reaches students through course design, access to equipment and mentors, and the assessment of practical work. Aim: This study examines how employer requirements can be translated into assessable course tasks. Methodology: A documentary case study draws on Chinese policy and curriculum standards, a 2026 employer consultation by Minxi Vocational and Technical College, and public accounts of cooperation with Zijin Mining and a regional industry advisory committee. Findings: The documents establish that the college consulted employers about design, manufacturing, and production-line maintenance. They also document an employer-sponsored training proposal and a channel for industry coordination. They do not establish student outcomes. The analysis identifies three implementation requirements: common competency expectations, explicit resource commitments, and verifiable student work. Conclusion: The paper proposes a semester pilot organized around a transmission shaft and bearing assembly. A shared project brief, jointly calibrated assessment, and a semester-end review connect employer participation with course decisions. The proposal can be adapted to different equipment and staffing conditions and should be evaluated after implementation.

KEY WORDS: higher vocational education, mechanical manufacturing and automation, modular curriculum, policy implementation, school–enterprise cooperation.

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1. Introduction

Mechanical engineering programs and their enterprise partners work to different schedules. Companies allocate staff and equipment according to orders and production needs, while colleges plan around semesters, course objectives, and instructional time. A visit to a well-equipped factory may give students little opportunity to make an engineering decision. In a bearing support project, for example, a design drawing, a finished part, and an operating assembly tell the instructor different things. Unless students connect the fit specified in the drawing to measurement and assembly evidence, the three products reveal little about their ability to explain an engineering problem across stages.

China's Vocational Education Law establishes a legal basis for school–enterprise cooperation (Standing Committee of the National People's Congress, 2022). The 2018 cooperation measures assign implementation roles to schools and enterprises, while the 2022 reform guidelines call for joint development of courses and practical competency projects (Ministry of Education of the People's Republic of China et al., 2018; General Office of the CPC Central Committee & General Office of the State Council, 2022). The 2025 national curriculum standard for Mechanical Manufacturing and Automation identifies process engineering, tooling design, installation, commissioning, and maintenance among relevant occupational areas (Ministry of Education of the People's Republic of China, 2025). These provisions imply a program-level management problem: which employer requirements enter the curriculum, what resources support training, and what evidence supports decisions about continuation?

This study uses the higher vocational diploma program in Mechanical Manufacturing and Automation (460104) at Minxi Vocational and Technical College as the institutional case. It asks how requirements gathered from different firms can inform a shared curriculum, how training can continue when workplace resources change, and how the college can use learning and delivery records to review a partnership.

2. Methods and Materials

The study uses policy document analysis and a single-college documentary case study. The source set comprises national policy and curriculum documents and three college reports on employer consultation, discussions with Zijin Mining, and the annual meeting of the Longyan industry advisory committee. The policy texts were read for institutional responsibilities, learning requirements, and implementation safeguards. The case reports were examined for dates, participating organizations, activities, and the status of each initiative. The unit of analysis is the sequence through which a proposed cooperation activity becomes a course task and, potentially, an assessed learning experience.

Implementation research shows how outcomes depend on resource and decision handoffs across organizations (Pressman & Wildavsky, 1984). Research on collaborative governance emphasizes institutional design, incentives for participation, and sustained interaction (Ansell & Gash, 2008). In this case these ideas direct attention to four observable steps: identifying demand, translating demand into course tasks, delivering agreed resources, and using assessment evidence to review the project. The corresponding records are an occupational task description, a course brief, a delivery log, and assessed student work. The college reports establish activities and organizational conditions. No original interviews, student scores, placement records, or employer retention data were analyzed.

3. Case Evidence and Implementation Challenges

3.1 Employer consultation and shared competencies

From July 16 to 18, 2026, the School of Intelligent Manufacturing sent program faculty to more than ten firms in Longyan. The visits covered businesses in areas including hydraulics, automotive components, powder-processing equipment, and numerical control. They examined occupational requirements for three proposed modules: design, manufacturing, and production-line maintenance (School of Intelligent Manufacturing, Minxi Vocational and Technical College, 2026a).

This activity gives the program a way to compare employers' requirements. Reading drawings, measuring critical features, and deciding whether results meet stated criteria can be taught across settings. Particular machines, proprietary instructions, and plant reporting procedures can be addressed in employer-specific assignments. To make consultation useful for course planning, faculty can ask employers to specify what novices should do, how work is judged, what mistakes are consequential, and which parts of a task require supervision. The college announcement documents the consultation. It does not provide a complete list of approved assignments or evidence of their use in class.

3.2 Zijin Mining and the scope of workplace learning

A college report dates the first Zijin class, established with Zijin Copper, to 2009. At the time of its November 2025 report, the college said that Zijin Mining Group had hired more than 350 of its graduates. The parties reached a preliminary understanding about training in mining machinery and haul-truck maintenance, primarily for students entering in 2026 (Chen, 2025). The hiring count is cumulative and college-wide. The announcement provides neither a program-level denominator nor the cohort-level outcomes needed to estimate retention or the effects of the training arrangement. It describes the new project at the stage of preliminary agreement.

The proposal illustrates the difference between a broad occupational requirement and a site-specific assignment. Reading mechanical and hydraulic drawings, recording equipment condition, and developing a verification plan are transferable. Use of a particular diagnostic interface or restricted maintenance procedure depends on the employer's equipment, authorization, and safety requirements. The college can teach the former in common modules and agree with the employer on where and when the latter can be introduced.

3.3 Regional coordination and delivery within a semester

The Longyan industry advisory committee for mechanical manufacturing vocational education met at the college on November 6, 2026. Participants discussed regional workforce needs in mechanical equipment and special-purpose vehicles and considered forms of cooperation (School of Intelligent Manufacturing, Minxi Vocational and Technical College, 2026b). Such a forum can help the program test whether proposed course criteria are relevant across employers. For example, manufacturing and maintenance firms can review the minimum evidence needed for a first-piece inspection or the operating conditions under which equipment measurements are comparable.

A regional forum does not allocate every workstation or mentor shift. These decisions belong in a semester-level agreement. Without an agreed fallback, a factory shutdown or mentor reassignment can

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leave groups with different opportunities to practice. The college must then be able to adjust the setting while preserving the competency being assessed.

4. Optimizing the Implementation Mechanism

4.1 Assign resources and responsibilities in a project brief

For each pilot, the school can designate a program lead and use one semester brief. The academic affairs office approves course objectives, instructional time, and assessment rules. The program team prepares the assignments and organizes instruction. The enterprise identifies a technical mentor, available workstations, dates, and restrictions on the use of technical information. The brief should specify student deliverables, instructor time, consumables and inspection costs, safety responsibilities, a change procedure, and the evidence required for renewal. The industry advisory committee can assist with checking demand or identifying alternative partners.

Participation can be scaled to the enterprise's capacity. A firm with a stable training team can host a module, while a specialized supplier can contribute a drawing, an inspection session, or a review of student work. If workplace access is withdrawn, the program lead can activate a preapproved campus task using equivalent requirements and assessment criteria. The change and the students' actual activities should be recorded. Students who leave an employer-sponsored track should have access to an equivalent route to course credit.

4.2 Link design, manufacture, and maintenance through one engineering object

A small transmission shaft and bearing support assembly is proposed as a semester pilot. It links design choices about fits, tolerances, and access for assembly to manufacturing decisions and maintenance observations. The course team can use a training component or an authorized, de-identified drawing. It should retain the constraints that drive engineering judgments, such as operating load and speed, mounting space, datums, and critical dimensional and geometric tolerances. The number of parts and operations can be adjusted to available equipment and instructional time.

Table 1. Proposed learning tasks for the shaft and bearing support assembly

Module	Student task	Evidence submitted
Design	Select a support arrangement for stated service conditions, identify datums, fits, and critical tolerances, and explain assembly requirements.	Versioned drawing and justification of critical choices.
Manufacturing	Plan the operation sequence and workholding, inspect the first piece, and assess a departure from tolerance.	Operation sheet, raw inspection values, disposition, and proposed correction.
Production-line maintenance	Check assembly condition, examine readings taken under comparable operating conditions, and propose diagnostic and verification steps.	Assembly checklist, original readings, and diagnostic and verification notes.

The three modules use a common set of critical requirements. A fit specified in design must be measurable in manufacturing. The inspection record then gives the maintenance group evidence with which to interpret a symptom such as unexpected clearance or runout. Where results disagree, students first check the datum, the instrument, and the measurement conditions. They then compare plausible explanations in design, machining, and assembly. When the evidence supports several explanations, they identify the next observation needed. An enterprise mentor can check whether the plan reflects real production constraints, while the college instructor sets the scope, difficulty, and assessment criteria.

4.3 Use independent work and calibrated assessment

A common rubric can assess technical judgment, measurement, interpretation of evidence, and verification. Four levels distinguish absent evidence, performance with guidance, independent performance, and independent performance with a justified transfer to a different situation. Group members may share raw observations, but each student submits an individual explanation and completes a comparable task with changed conditions. College and enterprise mentors first score the same sample work, discuss discrepancies, and review original records where judgments diverge. The college confirms the grade under its course rules.

Safety authorization is a prerequisite for relevant practical work. Machine operation, powered trials, and work involving hazardous energy must be supervised in accordance with applicable site procedures. Students require appropriate preparation when equipment or tasks change. Where activities qualify as workplace placements, the college and its partner follow national requirements for site review, agreements, supervision, insurance, and student protection (Ministry of Education of the People's Republic of China et al., 2021). The college can suspend an activity and provide an equivalent learning task when conditions are unsuitable.

4.4 Review learning evidence and delivery together

The program can track three measures using existing records. Mentor delivery is the proportion of agreed sessions actually provided, reported separately for the college and the enterprise. Valid task completion is the proportion of students enrolled at the start who meet the common standard and submit complete evidence, with withdrawals and missing work reported. Change in independent performance is assessed using comparable pre- and post-tasks, with the number of paired records and the distribution of scores stated.

The measures serve different decisions. If workstation access is unreliable but an equivalent campus task supports similar learning, the next brief can revise the enterprise's role. If the agreed mentoring is delivered but students repeatedly misinterpret an out-of-tolerance result, the program should inspect the prerequisite work, feedback, and measurement practice. A task that depends on an unavailable machine may need to be reduced in scope. Unresolved safety or student protection issues require review before the relevant activity resumes.

5. Pilot Design, Transfer, and Limitations

A first pilot can be embedded in one course or a capstone practical

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unit. Before teaching starts, the program lead and employer mentor approve the drawing, measurement resources, sample work, fallback task, and minimum evidence for a passing grade. The course team records baseline performance in drawing interpretation and measurement. During teaching, students hand over the approved drawing and inspection record with the part. At the end, a task with a changed fit requirement or assembly condition tests whether students can transfer their reasoning. The semester review considers student work alongside actual workstation use, mentor time, and direct costs.

A parallel class could use the same rubric and comparable tasks. If enrollment is self-selected or classes have different equipment or instructors, baseline measures and conditions should be reported. With small samples, paired changes and representative student work can show whether the pilot is feasible and where difficulties persist. Claims about employment outcomes would require follow-up data coded by actual job duties, with the coverage of that follow-up reported.

The project brief, assessment rules, and semester review can also be used in other programs. In numerical control the engineering object might be a part requiring first-piece inspection and process correction. In mechatronics it might be an actuator that requires commissioning and fault isolation. The tasks, risks, and equipment should be recalibrated for each setting. The present study provides a documented basis for designing such pilots. It cannot establish their effects on learning or employment.

6. Conclusion

The college's employer consultation identifies three areas for curriculum development: design, manufacturing, and maintenance. The proposed shaft and bearing assembly pilot links these areas through drawing requirements, inspection evidence, and maintenance reasoning. A shared brief commits resources to the teaching period, while independent work and a semester review guide decisions to retain, revise, or suspend activities. The pilot's effects remain to be tested.

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