

AI-Supported Vocational Teacher Education for China–ASEAN Cooperation

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Abstract: In China–ASEAN cooperation, vocational teachers need to turn occupational requirements into teachable tasks and adapt instruction to particular institutional and cultural settings. Access to artificial intelligence (AI) tools cannot provide this preparation by itself. Drawing on selected educational research and a Guangxi reform proposal, this conceptual study develops a framework for undergraduate vocational teacher education. Four competency domains are connected through six implementation pathways and two improvement cycles. Within this arrangement, AI supports diagnosis, resource adaptation, rehearsal, and feedback; educators retain responsibility for pedagogical decisions and assessment. A worked teaching scenario, intended as an illustration rather than a field report, shows how regional resources can become curriculum tasks. Evaluation would combine assessed teaching performances, revision records, transfer tasks, and implementation evidence. The design links regional curriculum adaptation to teacher agency and programme review. Whether these connections improve teaching competence, and under what institutional conditions they can be sustained, remains to be established through empirical evaluation within vocational education.

Keywords: vocational teacher education; artificial intelligence; China–ASEAN cooperation; teacher agency; formative assessment

1. Introduction

Artificial Intelligence (AI) in the field of education is used for assessment, tutoring, learner assistance, and decision-making [1]. Documentations point out the ways in which AI can help teachers with planning, teaching and assessment [2]. However, these are not enough for designing a teacher education programme. In language-teaching research, there is a division of labour: AI gives the content and conversation; teachers organise the resources and make the pedagogical judgments [3]. Designing such a division in terms of learning activities means taking into account the educational roles assigned to AI and the intended learning outcomes [4]. Decision-making related to learners' autonomy, data use and accountability has to be done within this context [5].

In terms of undergraduate programmes to train technical and vocational education and training (TVET)

teachers, the starting point should be practice. Students should be able to convert it into learning activities. In China–ASEAN cooperation, technical explanations, the requirements for assessment and interactions in class should be adapted to the particular partner context. Such adaptations especially when institutional requirements vary cannot be made according to the region. The China–ASEAN cooperation term is mentioned here to show a specific area of education practice. It does not mean any common curriculum or educational culture.

According to the Guangxi proposal, there are four concerns: insufficient alignment between the programme objectives and course content, discontinuity between the university teaching and practical preparation of future teachers, poor assessment and quality assurance, and inadequate coordination among teachers and regional resource providers. This is a contextual diagnosis, made according to the project documentation and not a survey among representatives of this group. The programme should solve a translation issue: technology, industry information, and cooperation resources should be transformed into the tasks where teaching skills will be assessed.

There are two questions for the design analysis of this programme: what competences should vocational teachers have for implementing AI-supported China–ASEAN cooperation? How can the tasks of the curriculum, supervised practice and assessment connect those competences with improvement? The suggested contribution to the design is programme-level (not tool-level): it should specify those connections. The students' performances expected, AI assistance and educators' role have to be defined together so that the evaluation of design could follow.

2. Conceptual Basis and Development Approach

2.1. Connecting Alignment with Situated Professional Learning

In the context of designing curricula, constructive alignment means matching intended learning outcomes to learning activities and assessment [6]. Competency entails both task and observable evidence. Asserting that students “understand vocational education” without asking them to apply their understanding in translating occupational requirements to curriculum development remains ambiguous. Situated teacher learning according to

Korthagen explains why theoretical knowledge is sometimes insufficient to guide actual teaching in classrooms [7]. Thus, the concepts of courses ought to be revised via rehearsals and supervision, with reflections based on learners' responses to the taught lessons.

Research on teachers' professional knowledge highlights the pedagogical and ethical knowledge needed to integrate AI into teaching [4], while findings about the types of collaboration provide several configurations [8]. It is not implied that one configuration must be adopted according to these descriptions. Concepts will be used as design resources, especially those relating to responsibility division among teaching tasks. Whether the configurations are useful for the suggested program can only be evaluated based on the evidence from this research.

2.2. Documentary Analysis and Framework Construction

In the course of conceptual analysis, the selected literature was examined along with the Guangxi proposal on "Construction and Practice of an AI-Empowered Vocational Teacher Education Model for China-ASEAN Cooperation." This proposal provides the context, problem statements, and resources. The research adds principles of alignment, situated learning, human-AI collaboration, and assessment. Journal publications were chosen due to their relation to the mentioned principles, and fundamental descriptions were kept for constructive alignment and situated teacher learning. Selective synthesis cannot be regarded as systematic reviewing: neither exhaustive search nor screening has been carried out.

In the process of framework construction, concerns of the document were formulated as design requirements, mapped to competencies and assessable tasks, with assignment of responsibilities and feedback. Each requirement had to cover a concern and involve a particular student action. Application of this criterion to six pathways ensured alignment of the design with teaching work. The map of competencies serves as the synthesis of this paper. Further expert review and learner trials are required for validation of these categories.

For prospective programme implementation, the instructional example, role allocation, and evaluation protocol extend the proposal into a programme design. They specify work yet to be undertaken. These additions, including the worked scenario, report neither completed activities nor observed effects. Contextual review and empirical testing must precede any claim about the framework's educational value.

3. Programme Framework

3.1. Aim and Competency Domains

In the proposed programme, vocational teachers learn to translate occupational practice into instruction for a specified cooperation setting. Table 1 sets out four domains: vocational curriculum understanding; instructional design and enactment; assessment and reflective improvement; and regional understanding and intercultural adaptation. These categories, used to organise assessable teaching work, are proposed rather than psychometrically established and require subsequent validation.

Table 1. Proposed competencies and assessable evidence.

Domain	Student action	Evidence
Curriculum	Translate occupational requirements into outcomes	Curriculum map and rationale
Instruction	Design and enact a supported practical task	Lesson plan and observed teaching
Assessment	Interpret feedback and justify revisions	Rubric, feedback and revision record
Regional adaptation	Adapt a task to a documented partner setting	Comparative case and adapted lesson

Across these domains, AI literacy concerns judgement and tool use. Students need to recognise limitations, verify outputs, and explain when assistance is warranted. Incidental exposure can leave teachers with incomplete understandings of AI [9]. Studies of AI-assisted task development highlight challenges in the clarity and contextualisation of generated materials [10], complementing research on factors influencing teachers' AI integration [11]. Verification and adaptation should be taught through professional tasks and assessed in students' explanations of choices.

3.2. Six Implementation Pathways

Across the course group, curriculum alignment is organised through a matrix of programme outcomes, course outcomes, tasks, and evidence. Demands increase progressively. Vocational education, educational psychology, curriculum development, instructional design, and assessment contribute different perspectives. A case may recur, particularly across linked courses, provided each assignment introduces a intellectual or practical requirement.

Within AI-supported teaching, diagnostic tasks guide resource selection and teachers review suggestions. Students record how assistance affects decisions. Teaching rehearsal, the third pathway, puts decisions into practice: a lesson segment is designed, taught, discussed, revised, and taught again. To complete the task, students must explain their revisions using feedback rather than submit only a polished plan.

For regional case development, the fourth pathway, each case records its country, institution, vocational field, source date, learner profile, and constraints. Collaborative practice brings university educators, vocational-school mentors, and industry advisers into the fifth pathway. Their expertise informs the tasks. Evidence-based assessment, the sixth pathway, assembles lesson plans, recorded performances, mentor observations, and revision commentaries into a portfolio. As Figure 1 indicates, this evidence must connect teaching work to programme improvement.

3.3. Two Connected Improvement Cycles

At the learning level, students design, rehearse, receive feedback, and redesign. Programme review follows a plan-do-check-act cycle: educators establish outcomes and tasks, implement them, examine evidence, and revise the provision. PDCA organises this work; it does not

demonstrate that improvement has occurred. The two cycles are connected by anonymised assessed performances and documented difficulties, including problems that recur across tasks. If students repeatedly struggle to explain a technical procedure, for example, educators can revise course sequencing or allocate mentor support to that specific difficulty.

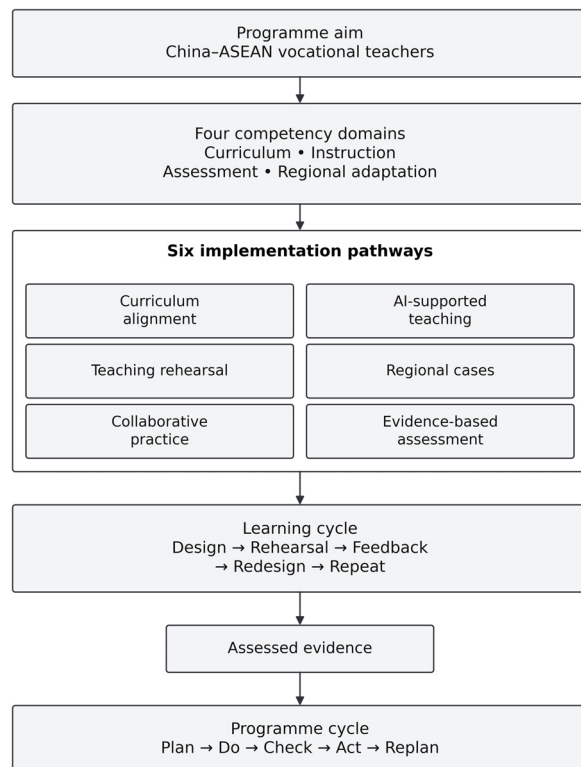


Figure 1. Conceptual framework for AI-supported vocational teacher education in the China-ASEAN context.

4. Implementation Design

4.1. Preparing Educators and Allocating Responsibility

For an initial implementation, a small group of linked courses and an agreed vocational specialism provide a manageable starting point. Educators review an existing assignment, identify its intended competence, test an AI-supported revision, and calibrate scoring. Readiness needs thorough checking. Reports of deficiencies in teachers' technical and content knowledge raise a warning not to assume readiness [12]. Perceptions from students, including the advantages and worries regarding the truthfulness and confidentiality of the work, bring another viewpoint [13]. Before task deployment, instructors need to find out the requirements for access, previous experience, and support for each learner.

In the cooperation, clear roles need to be assigned. University instructors manage curriculum fit and evaluation; vocational school mentors judge feasibility and reactions of learners. Professionalism and safety of practice are verified by industrial partners. Contextualization and linguistic issues are examined by regional or partner educators, especially in cases of translation. A programme manager keeps case files, arranges moderation, and notes

down modifications. Hence, cooperation requires role allocation and arrangements for evaluation; cooperation agreement itself is not enough.

4.2. Organising Human-AI Work across a Teaching Task

Diagnostic activities and drafts are carried out by the learners independently prior to instruction. Artificial intelligence might later suggest explanations, questions or modifications that are based on appropriate materials. Every such suggestion and whether it is consistent with the learner's profile is checked against the source material. Review of chatbots highlights instructional support and reliability considerations [14]. Automated output must only be included into the lesson once the student confirms its accuracy.

During rehearsal, peers and educators use a rubric to observe teaching. AI-assisted transcription or annotation may locate questioning sequences, unclear terms, and missed checks of understanding. The recording remains the reference. Annotations, particularly interpretations of interaction, need verification. A hybrid-learning perspective distinguishes how people and technology share control [15]; educators here retain authority over interpretation and feedback priorities. Neither speech quantity nor detected keywords can stand alone as a measure of teaching quality.

After rehearsal, students explain the problem identified, feedback considered, action taken, and reasons for the revision. They then teach again to test the change. Teacher-facing analytics research emphasises actionable information and teachers' involvement in tool design [16]. Multimodal analytics research, with its attention to learning theory, cautions against disconnected measurements [17]. Portfolio entries should be selected for the instructional judgements they support, rather than collected simply because a trace exists.

4.3. Worked Regional Teaching Scenario

For a proposed China-ASEAN vocational teaching unit, equipment inspection records provide an illustrative task. No partnership or field trial is being reported. Educators select a documented partner setting and assemble a source pack: a technical task, an approved vocabulary list, a learner profile, and relevant curriculum expectations. The industrial material, including explanations used in the lesson, must be reviewed by a suitably qualified practitioner before it is introduced into classroom teaching.

Before lesson design, students identify the knowledge and procedures novices need to interpret an inspection record. Learners are then asked to detect an inconsistency, explain its significance, and justify a response. AI may propose explanations at different language levels or source-based questions. Its additions, especially translated technical terms, require checking by students and human reviewers. Learner ability and classroom preferences must be established from evidence about learners, not inferred from nationality.

During rehearsal, peers work with the documented learner constraints. Observers assess explanation accuracy, the sequence of support, language accessibility, and

checks for understanding. Feasibility is reviewed by a vocational-school mentor; a partner educator, where available, examines contextual appropriateness. Students revise the lesson before adapting it to a second documented setting with a different learner profile or resource constraint. The two versions allow a comparison. Students must identify which features remain necessary, which have changed, and what evidence about the second setting justifies each adaptation.

Within this task, institutional comparison becomes a matter of professional judgement. Resources from the regional research centre are converted into source materials, a problem, and assessable work. Students must justify choices with contextual evidence, particularly when adapting a lesson across settings. Regional labels cannot provide that justification. Without partner participation, the assignment should remain identified as a simulated case whose cultural validity remains to be established.

4.4. Maintaining Agency and Feasible Governance

As far as programme governance is concerned, educators specify allowable use, disclosure of AI support, and provision of equal access or a different process flow. Processing of data is limited to information that is essential and consensual. Class recordings in which people can be identified are only allowed on authorized platforms. The notions of autonomy and accountability form the basis of such a setup [5]. AI recommendations are advisory in essence; assessments contested by learners should be reconsidered by educators authorized to make changes.

Concerning delivery conditions, feasibility depends on the amount of time educators have, mentors being present, and reliability of technical tools. A study analyzing the implementation of AI in higher education notes novelty effects, digital divide, technical inadequacies, and ethical issues [18]. Performance is related to the individual and task-specific features in an experiment involving student-AI cooperation [19]. This implies that benefits cannot be taken for granted. Studies on the autonomy of student teachers, making a difference between critical and non-critical involvement, give reason to study the use of support [20]. Programme evaluation should take into account the rational decision-making and analysis of beneficiaries and workload.

5. Evaluation and Discussion

5.1. Prospective Evaluation Protocol

Regarding evaluation, feasibility and learning effectiveness should be investigated in different ways. Can the task be done, can the mentor provide some moderate evidence, and can the students make several attempts? The first step would be making a pilot investigation under these circumstances. Then, one can conduct a comparison using a traditional form of this course with the same amount of time used for instruction. The corresponding evidence is described in Table 2.

For the main outcome measure, two trained raters will score a standardized teaching task, and group-level blinding will be employed as much as possible. Tasks conducted before and after the intervention should be compa-

table in difficulty. The delayed test, which excludes AI assessment, raises the question of maintaining competence without the support of artificial intelligence. There are some studies on intelligent tutoring systems for psychomotor tasks that highlight the importance of repetition and feedback but point out a lack of task generalization [4]. Therefore, generalization has to be assessed beyond the rehearsed example, and students have to use judgment on an unfamiliar teaching challenge.

Table 2. Proposed pilot evaluation.

Focus	Evidence	Interpretation
Competence	Common teaching task before and after	Blind scoring where feasible; assessor agreement
Transfer	Delayed task without AI	Independent performance in a new case
Process	Revision records and interviews	How feedback informs decisions
Feasibility	Delivery logs and mentor workload	Fidelity, access and resource needs

When random class assignment is impossible, researchers have to provide information about students' initial competence, their previous experience with artificial intelligence, course experience, and the differences between instructors. Clustering has to be addressed in analyses, and results should include effect sizes, precision, dropout, and fidelity. Pre-post single-group design may help in revising but not in distinguishing between maturation and practice effects. Interviews and revision logs may shed light on how feedback is used, and performance scores interpretation requires data about interrater reliability and scoring examples.

5.2. Contribution and Boundaries

On the program level, the approach encompasses the processes previously examined separately in the proposal: task derivation from occupation and regional resources, professional development with the use of artificial intelligence, and using performance data for course redesign. Constructive alignment shows how outcomes, tasks, and evidence relate. Situated learning contextualizes the teaching process. Human and artificial intelligence work collaboratively to share responsibilities, especially interpretation and evaluation. All of them determine a program design, whose processes deserve empirical study.

Transferring the approach to other regions will require locally validated cases and appropriate mentors. Differences in the national and institutional context will be transformed into task conditions for students' interpretation. This is the expected regional contribution to the field. While the literature is mainly based on broader contexts of schooling and higher education, it does not confirm the effectiveness of preparing China-ASEAN vocational teachers in the current way. Four domains and six pathways are to stay open for reconsideration when necessary.

With an integrated intervention, the influence of each component – artificial intelligence, more practice opportunities, mentoring, and regional cases – cannot be separated. Further research can experiment with individual

components and keep other conditions unchanged, including the instructional time. The portfolio approach requires resources, especially in situations of unequal access or limited time of mentors. Educators must collect sufficient evidence for making improvements and evaluate whether the value is worth the effort.

6. Conclusion

With regards to the development of vocational teachers in order to facilitate cooperation between China and ASEAN countries, this framework brings together four competencies, six paths to implementing them and two improvement cycles. The efficiency of this framework is shown through the use of a scenario. The occupational and regional resources are made into tasks which can be measured, and the evaluation process takes into account assisted performance, independence and transfer. Educators' evaluation skills and students' autonomy, particularly in interpreting the computerized advice provided, continue to play an essential role in curricular decision making. Assertions about improved teaching competency abound, but they require validation.

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