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Reform and Innovation of Course Assessment for Landscape Engineering Construction Technology: A Case Study of the Environmental Design Major at Chongqing Institute of Engineering

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Abstract: Aiming at the long-standing problems of application-oriented undergraduate environmental design courses relying on closed-book final written examinations and the disconnect between assessment content and construction post competency requirements, this paper takes the course Landscape Engineering Construction Technology at Chongqing Institute of Engineering as the object and reconstructs the course assessment system based on the Outcome-Based Education (OBE) concept: the closed-book written examination is abolished, and the overall grade is composed of after-class assignments, design schemes, and comprehensive assessment of the final project; group project-based assessment is carried out using real enterprise-commissioned horizontal projects as carriers; a multi-agent evaluation mechanism combining teacher evaluation, student peer evaluation, and AI-assisted evaluation is established; and the whole-process assessment data are retained on the Chaoxing Learning Platform. In response to remaining problems such as "free-riding" in groups, difficulty in monitoring the AI use process, and increased burden of assessment material archiving, improvement measures are proposed, including refining individual contribution evaluation, defining the boundaries of AI use, and adding special practical training in construction organization, so as to provide a reference for assessment reform of similar application-oriented courses.

Keywords: Course assessment reform; Landscape Engineering Construction Technology; Outcome-based education; Project-based assessment

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1. Introduction

In October 2020, the Central Committee of the Communist Party of China and the State Council issued the Overall Plan for Deepening the Reform of Educational Evaluation in the New Era, proposing to

"improve outcome evaluation, strengthen process evaluation, explore value-added evaluation, and improve comprehensive evaluation" [1]. The baton of examination evaluation has thus returned to the perspective of course designers. For local undergraduate colleges and universities that mainly cultivate application-oriented talents, this requirement is particularly urgent: the landscape design talents trained by schools should be able to "do projects" after graduation, while what a closed-book examination paper can test is often only the firmness of short-term memory. In relevant documents on the construction of first-class undergraduate courses, the Ministry of Education also emphasizes the process-oriented and diversified nature of course academic assessment [2].

Outcome-based education (OBE) gives a more direct response to this: evaluation should measure what students "can do," rather than what they "remember" [3]. Landscape Engineering Construction Technology is a direction-specific compulsory course for the Environmental Design major at Chongqing Institute of Engineering. The course undertakes three tasks: mastering the basic technologies and crafts of landscape construction, drawing standardized construction drawings, and organizing construction schemes for specific sites with innovation. None of the three tasks can be completed by rote memorization. However, before the reform, the grade for this course was almost entirely determined by a closed-book final written examination. In successive years of examination paper analysis and daily assignment review, the course team repeatedly observed the same disconnect: students could accurately write textual analyses of drawing errors on the examination paper, yet their own CAD assignments had chaotic line types, missing dimensions, and incorrect vertical relationships; the attainment of the two course objectives—construction drawing production and project innovation practice—remained low for a long time.

In May 2024, the course team applied to the Academic Affairs Office of the university for a course assessment reform project and obtained approval. From September 2025 to January 2026, the reform was fully implemented for one round in the first semester of the 2025–2026 academic year, covering Class 2 of the 2023 Environmental Design cohort and Class 4 of the 2025 Environmental Design cohort (junior-college-to-undergraduate program). This paper records the conception and implementation process of this reform, reports the effects reflected in the assessment data, and honestly discusses the problems exposed during the process and the countermeasures.

2. Theoretical basis and design logic of the reform

2.1. Anchoring assessment content to outcomes

The key point of OBE is reverse design: determine training objectives starting from industry and post needs, derive course objectives from training objectives, and then let course objectives in turn constrain teaching content and assessment methods [3]. Li Zhiyi calls "bringing outcome orientation into the classroom" the "last mile" of engineering education professional accreditation—the conceptual level has been sufficiently discussed, and the difficulty lies in truly implementing evaluation in individual specific courses [4]. For Landscape Engineering Construction Technology, the first step of implementation is to translate the three course objectives into observable and scorable behaviors: being able to check and correct a set of construction drawings against standards; being able to complete the whole process from investigation to construction organization design under given site conditions; and being able to make evidence-based optimization and innovation of schemes. Assessment propositions, scoring rubrics, and grade structures are all developed around these behaviors.

2.2. Process evaluation and "work-type" evidence

Process assessment has accumulated years of practice in domestic colleges and universities. The "N+2" model of Hefei University (one final examination plus multiple daily assessments) earlier proved the inhibitory effect of multiple scoring on "end-of-term cramming" [5]. However, the carriers of most process assessments are attendance, quizzes, and daily assignments, which are more suitable for knowledge-based courses. The outputs of landscape engineering courses are "work-type" evidence such as drawings and specifications, with long formation cycles and many iterations; looking only at the final result cannot restore students' true level. Therefore, the process evaluation of this course must be based on staged drawing assignments and AI application reports, leaving traceable marks for every step of work.

2.3. Real projects as assessment carriers

Environmental design courses have relatively mature experience in introducing project-based teaching, and the role of project-driven teaching in cultivating students' scheme ability and comprehensive quality has also received empirical support [6]. This project goes one step further on this basis: the carrier of the final assessment is directly taken from a real enterprise-commissioned horizontal project undertaken by the teacher—Interior and Exterior Environment and Construction Organization Design of Wanfenglin Homestay in Shizhu, Chongqing (Project No. 2025hxky-93). Real projects come with constraints and client demands; the site is real, and cost and schedule pressures are also real, so students cannot avoid contradictions by using an "imagined site." To control workload, the project was trimmed during assessment into a small landscape engineering project of 900–1,000 m², to be claimed and completed by groups of 1–3 students.

3. Problems of the original assessment model

3.1. Basic course information

The course code is 20234021, with a total of 48 class hours, including 16 practical hours, and 3 credits. It is offered in the first semester of the third year and is taught to both regular undergraduate classes and junior-college-to-undergraduate classes. Differences in student sources are an objective condition that has long existed for this course: a considerable proportion of junior-college-to-undergraduate students did not major in landscape in junior college, and their drawing foundations vary, which directly affects fairness under unified assessment standards.

3.2. Four problems of the original assessment model

First, assessment content is misaligned with course objectives. Closed-book examination papers are good at testing "what it is"—term explanations, standard provisions, and process flows—while the two objectives of construction drawing production and project innovation practice require "making it." The most direct consequence of this misalignment is that line-type and dimension errors repeatedly appearing in daily assignments carried almost no cost in the overall grade, and students lacked motivation to correct them.

Second, the evaluation subject is single. One course teacher evaluated everything; students did not pay attention to each other's schemes, and industry perspectives and peer perspectives were entirely absent; abilities clearly required by posts, such as oral expression and teamwork, had no place on the transcript.

Third, assessment is disconnected from digital tools. AI-assisted drawing and parametric drawing have entered the daily workflow of the design industry, and relevant discussions have also been fully carried

out in the education field, yet course assessment did not respond to this, creating a gap between the post-competency requirements students face and classroom evaluation [7].

Fourth, feedback lags. After the final examination ends, scoring, archiving, and reporting are completed, and assessment data then fall dormant, having almost no impact on the next round of teaching; "promoting teaching through assessment" exists in name only.

4. Reconstruction and implementation of the assessment system

4.1. Overall grade structure

The reform completely abolishes the closed-book written examination. The overall grade consists of three parts: after-class assignments (20%), design scheme (40%), and comprehensive assessment of the final project (40%). The final comprehensive assessment is subdivided into outcome works, design specification, and presentation defense, accounting for 20%, 10%, and 10% of the overall grade, respectively. Each assessment link corresponds to a clear course objective, and any score can be traced to a specific competency indicator, thus providing a reliable data entry point for course objective attainment analysis.

4.2. Multi-agent evaluation and platform support

The evaluation subjects are expanded from the teacher alone to three parties: the teacher is responsible for checking technical standards and drawing quality; student peer evaluation focuses on group collaboration and scheme creativity—peers' sensitivity to hand-drawn drawings often exceeds teachers' expectations; AI tools undertake preliminary screening and error-correction prompts, giving instant feedback on standardization issues in drawings. The weights of the three parties are specified in advance in the scoring rubric to avoid on-the-spot discretion. At the platform level, all assignments, staged drawings, peer evaluation records, and project outcomes are uniformly submitted to the Chaoxing Learning Platform, which completely retains learning trajectories, and the grade composition is transparent to students. Practices in similar domestic courses also show that online teaching platforms have obvious supporting effects on the organization and traceability of process assessment [8].

4.3. Organization of final project assessment

The final assessment is conducted in groups, completing the workflow of a small landscape engineering project: preliminary investigation, scheme design, construction drawing production, construction organization design, and outcome integration. Finally, a complete set of outcomes is submitted in PDF form, and a centralized presentation defense is attended. The scoring focuses of scheme design, specification, and defense are different—the specification focuses on the systematicity of literature review and the scientificity of research methods, and the defense focuses on logical expression and adaptability—so the group must divide labor and cooperate to cover all aspects, and the division of labor itself becomes part of the assessment.

4.4. Integration of AI tools and scoring rubric

In process assessment, students need to use AI tools to retrieve landscape construction cases, generate preliminary schemes, and conduct optimization analysis, and simultaneously submit AI application reports; the first draft of construction drawings may be completed with AI drawing tools, and teachers correct and guide the AI-generated content. The scoring rubric is specially designed for this: hand-drawn analysis and sketch expression account for 5 points, AI drawing, software drawing, and drawing expression account for

10 points, and text layout accounts for 5 points. In the level descriptions, "dialectically using AI tools and revising AI drafts in combination with industry standards" is listed as the excellent level, while "directly copying AI output or serious plagiarism in effect drawings" is pressed down to the failing level. The signal conveyed by this rule is clear: AI is a tool, and the assessment tests students' judgment in mastering the tool, not the output effect of the tool itself.

4.5. Assessment feedback feeding back into teaching

After the assessment reform was implemented, the classroom was adjusted accordingly. In response to the concentration of vertical drawing errors, the course added special practical training in CAD contour lines; local landscape construction cases in Chongqing were introduced to turn abstract crafts into specific cases; and teaching content such as AI drawing error correction and AI cost estimation was added. Teaching reviews are carried out twice each semester, relying on data from the Chaoxing Learning Platform on classroom participation, assignment quality, and objective attainment to dynamically monitor teaching quality, thereby establishing a closed loop of "assessment feedback—teaching improvement—quality enhancement." This step determines the quality of the reform: changing only assessment without changing teaching means project-based assessment is destined to become a formality.

5. Effects, problems, and discussion

5.1. Reform effects

At the data level, the overall course objective attainment increased by 21 percentage points compared with before the reform, exceeding the 20% expectation set in the application; in the anonymous end-of-term questionnaire survey, student course satisfaction was 91.2%, also higher than the preset indicator of 90%.

Changes at the ability level are more intuitive: the error rates of vertical design drawings and node detail drawings decreased significantly; most students could independently complete the preparation of small landscape construction organization designs, and the ability chain from "drawing design" to "construction implementation" was opened up for the first time; some groups' coursework, after polishing, participated in disciplinary competitions, and the transformation of "promoting competition through assessment" began to appear. Judging from the submitted AI application reports, most students have learned to use AI dialectically—no longer directly copying AI drawings, but making secondary optimization in combination with industry standards and using CAD and SU to complete final drawings. This habit is consistent with the competency requirements of digital posts in the industry.

5.2. Exposed problems

Beyond grades, the reform also exposed several problems that need to be recorded honestly.

The "free-riding" phenomenon in group assessment has not been eradicated. In groups of 1–3 students, some members still only participated in presentations and did not touch drawings, relying on the group's overall grade to score; process materials recorded submission trajectories but could not fully identify each member's true contribution, and individual ability evaluation was biased.

Process control of AI use is weak. The scoring table can evaluate final products but can hardly distinguish "optimizing with AI" from "copying AI output"; students' AI application abilities also show polarization—some skillfully use AI for site analysis and drawing error correction, while others have never tried.

Teachers' burden has increased significantly. After abolishing examination papers, the objects of grading became large numbers of group drawing PDFs, design specifications, presentation PPTs, and display boards, multiplying the workload; the Chaoxing Learning Platform lacks batch annotation tools for drawing-type assignments, and online grading efficiency is low; time for final defenses is limited, and judges find it difficult to participate deeply in process comments at each stage.

Differences in student sources are amplified by project assessment. Groups with better foundations could complete a full set of construction drawings and propose innovative optimization points; students with weak foundations repeatedly made line-type and dimension errors, and their ability to prepare construction organization designs was particularly weak, with high error rates in schedule planning and construction resource allocation, exposing insufficient support for construction management content in prior teaching. The gap between the junior-college-to-undergraduate class and the regular undergraduate class was further widened in the comprehensive assessment.

5.3. Responses and reflections

In response to the above problems, the course team adopted four measures in subsequent semesters: first, refine individual contribution evaluation, requiring groups to submit division-of-labor statements, asking in detail about the drawing details each person was responsible for during defense, and using the drawing revision trajectories retained on the platform as evidence; second, define the boundaries of AI use, with students submitting an AI use list along with outcomes, explaining which content was generated by AI and what modifications were made, and focusing assessment on identification and optimization ability; third, add special practical training in construction organization design and supplement demonstration teaching of Gantt chart preparation; fourth, implement tiered topic selection according to student foundations and control the match between project volume and class-hour constraints.

The deepest reflection the author gained from this round of practice is that assessment reform is by no means as simple as changing grade proportions. Once proportions change, teaching organization, resource allocation, and teacher–student roles all change accordingly. Project volume must be balanced against class-hour constraints; blindly pursuing project authenticity may mean students cannot produce high-quality outcomes within limited class hours, and the reliability of assessment is instead damaged. AI entering assessment is a general trend, but the bonus point should never be "using AI a lot," but rather people's judgment over AI output. Process assessment is also not equal to assigning assignments several more times—each process assignment must be anchored to course objectives and retain an evidence chain. Drawings, reports, defense videos, and peer evaluation records constitute the new assessment archive of this course; they are both the basis for scoring and the starting point for the next round of course improvement.

6. Conclusion

Taking the course Landscape Engineering Construction Technology at Chongqing Institute of Engineering as an example, this paper reports a practice of assessment reform based on outcome orientation. There are three conclusions. First, assessment of application-oriented landscape engineering courses must align with post workflow; diversified assessment using real projects as carriers and staged drawings as evidence can bridge the gap between "being good at examinations" and "being good at doing things," and data on course objective attainment and student satisfaction support this judgment. Second, the key to integrating AI into assessment lies in

the choice of evaluation focus—testing "judgment in mastering AI" rather than "AI output effect," supplemented by use lists and scoring rubrics, can largely resolve the integrity risks brought by technology while training students' digital engineering thinking. Third, assessment and teaching must be advanced in linkage; shortcomings exposed by assessment should be immediately transformed into teaching improvement actions, otherwise project-based assessment is merely examination-oriented education in another form.

The reform is still iterating. Identification of group contribution, grading efficiency of drawing-type assignments, and monitoring methods for AI use are all links that need further refinement in the next cycle. It is hoped that the path and lessons recorded in this paper can provide a referenceable sample for assessment reform of environmental design and even broader application-oriented courses.

Disclosure statement

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