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Research Article

Development of the OBE Talent Management Model of a Training Program Management on the Project-based Teaching-learning Method for Landscape Design Students at Hubei Engineering University, China.

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ABSTRACT

Landscape design education confronts critical challenges in reconciling pedagogical approaches with industrial requirements and cultivating professional competencies. This study develops an Outcome-Based Education (OBE) talent management framework specifically adapted to project-based instructional approaches for landscape design majors at Hubei Engineering University. The study establishes a systematic alignment mechanism between curriculum objectives, instructional implementation, and assessment strategies to ensure congruence with predefined learning outcomes, thereby enhancing educational quality. Employing mixed-methods research design, this investigation integrates structured focus groups, comparative curriculum analysis, independent samples t-tests, and learning outcome achievement evaluations. Empirical results demonstrate the model's efficacy in clarifying educational benchmarks, advancing learner-centered pedagogy, and maintaining assessment-competency consistency. The research contributes an operationalized OBE implementation framework for design disciplines, providing both theoretical advancement in competency-based education and actionable recommendations for curriculum optimization in applied arts programs.

Keywords: Landscape Design, OBE Management Model, Project-Based Teaching, Effectiveness Verification, Training Program

INTRODUCTION

As global higher education shifts toward outcome-based education (OBE), this pedagogical framework has gained prominence for aligning curricula with industry demands, particularly in engineering and design disciplines (Zhan et al., 2018). In China, rapid urbanization and ecological priorities necessitate innovative landscape design professionals capable of balancing aesthetics, functionality, and sustainability (Wang & Zhang, 2020). Hubei Engineering University exemplifies this shift, emphasizing OBE-integrated project-based teaching-learning (PBTL) to bridge theoretical knowledge and practical competencies. However, challenges persist in implementing OBE models, including misaligned training objectives, insufficient faculty expertise, and fragmented evaluation systems (Li et al., 2019).

Existing studies highlight critical gaps in landscape design education. While PBTL enhances problem-solving and creativity through real-world projects (Almulla, 2020), its effectiveness is hindered by illogical project selection, overemphasis on practical skills at the expense of theory, and faculty lacking industry experience (Liu, 2021). Additionally, vocational programs often prioritize artistic skills over job-specific competencies, leading to graduates with weak theoretical foundations and impractical design proposals. These issues underscore the need for a structured OBE talent management model that integrates PBTL pedagogy, industry collaboration, and continuous assessment.

Prior research emphasizes the role of OBE in fostering industry-academia alignment. For instance, Zhan et al. (2018) demonstrated how OBE-driven programs enhance students' adaptability to workplace demands. Similarly,

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Wang and Li (2022) identified five systemic barriers in PBTL implementation, including inadequate training facilities and evaluation mechanisms. Despite these insights, few studies address the contextual challenges faced by Chinese art and design institutions, where students' strong creative thinking contrasts with weak engineering literacy (Liu, 2021). This gap necessitates a localized model tailored to Hubei's ecological urbanization goals and the unique needs of fine arts students.

This study aims to address these gaps by answering three research questions: What are the key problems and needs in constructing an OBE talent management model for landscape design students in Hubei? How can an effective OBE-PBTL integrated model be developed? How should the model's effectiveness be evaluated?

The research focuses on Hubei Engineering University's Faculty of Fine Arts and Design, utilizing mixed-methods data from 200 students, 42 faculty members, and industry stakeholders. By aligning with China's Ministry of Education reforms and Hubei's ecological development plans, the proposed model seeks to standardize practical training, enhance evaluation systems, and achieve "zero-adaptation" graduate employability (Hubei University of Engineering, 2024).

Expected contributions include a validated framework for OBE-PBTL integration, addressing theoretical-practical disconnects, and providing policy insights for similar institutions. The study's outcomes aim to strengthen industry-academia collaboration, ensuring graduates meet societal demands. (Jiang & Tong, 2018).

LITERATURE REVIEWS

Definition of the OBE Talent Management Model

An educational concept and methodology based on student learning outcomes that emphasizes establishing clear, measurable learning goals in the educational process to ensure that students can demonstrate specific knowledge, skills, and abilities upon completion of their studies. The model closely combines curriculum design, teaching activities, and evaluation processes, focusing on developing students' practical competencies in specific fields, giving them integrated skills such as problem-solving, innovative thinking, and team collaboration (Wang et al. 2019).

Project-Based Teaching-Learning Method

Project-based learning (PBL) is crucial for developing practical and problem-solving skills. Zhang and Liu (2023) emphasize their role in landscape design education, where students apply theoretical knowledge to real-world projects. PBL enhances cognitive, social-emotional, and practical skills, promoting student motivation and engagement. It develops teamwork, time management, and the ability to articulate and integrate knowledge across disciplines (Shen, 2024).

Needs for OBE in Landscape Design Training

The OBE model addresses the need for alignment with industry demands, interdisciplinary learning, and practical skill development. Sun (2024) stresses the importance of structured course plans and PBL in fostering collaboration and problem-solving. Belyaeva and Denisova (2024) advocate for integrating fields like ecology and urban planning to tackle complex design challenges. Continuous improvement through feedback and multi-dimensional evaluation ensures curriculum relevance, though challenges like outdated materials and insufficient technology integration persist.

Effectiveness of the OBE Talent Management Model

The OBE model significantly enhances undergraduate education by aligning teaching objectives with outcomes. Li (2014) demonstrates its success in improving curriculum quality across institutional levels. Zhou (2024) highlights its effectiveness in design and horticulture education, where it fosters innovation and problem-solving skills through improved practice teaching systems.

Evaluation of the OBE Talent Management Model

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Effective OBE implementation requires comprehensive and multidimensional evaluation systems. Zhou and Huo (2023) advocate for process-based evaluations to reduce student pressure and enhance learning outcomes. Hou (2022) emphasizes the use of tools like student questionnaires, employer surveys, and expert evaluations to ensure teaching quality and alignment with societal needs.

RESEARCH METHODOLOGY

This study adopts a mixed-methods research approach, combining qualitative and quantitative methods.

Quantitative Research Methods

Two survey questionnaires were developed and distributed to 133 students and 47 teachers, and administrators at Hubei Engineering University. The surveys focused on four key areas: planning, implementation, assessment, and improvement of project-based teaching.

Model Building Methods

Theoretical elements are integrated into a cohesive framework. Core components—such as learning outcomes, curriculum structure, and assessment mechanisms—are identified and organized. Relationships and workflows, including the feedback loop from goal setting to evaluation, are designed to ensure coherence. Standardized diagramming software is used to produce professional visual representations of the model architecture. This process results in a systematic and well-defined theoretical model for an OBE-based landscape design curriculum.

Qualitative Research Methods

Focus group discussions were organized with participants, including teachers, administrators, students, and industry representatives. These discussions provided in-depth insights into the challenges, expectations, and potential improvements in project-based teaching for landscape design courses.

Experimental Method for the Control Group

A controlled experiment was conducted with two classes of landscape design students at Hubei Engineering University, comprising a total of 48 participants. To ensure equivalence, consistency, objectivity, and validity, one class was assigned to the experimental group, adopting the OBE Talent Management Model with project-based learning, while the other class served as the control group, following traditional methods. Comparative analysis of the two groups showed that the experimental group achieved better outcomes in skills development, engagement, academic performance, and professional ethics, confirming the effectiveness of the OBE model.

Data Analysis Methods

First, Descriptive statistics (e.g., mean, standard deviation) are used to summarize sample characteristics and variable distributions. Second, Correlation analysis explores relationships between variables. This study used an independent samples T-test to compare mean differences in learning outcomes between the experimental and control groups, validating the effectiveness of the new Model. By calculating p-values ($p < 0.05$) and effect sizes (Cohen's d), the statistical significance and practical relevance of the differences were determined, providing scientific evidence for the intervention's impact.

RESEARCH RESULTS

Problems and Needs of the Development of the OBE Talent Management Model of a Training Program Management on the Project-based Teaching-learning Method for Landscape Design.

Table 1 displays the mean. A survey of 133 students, 47 teachers, and administrators identified challenges and needs in implementing the OBE Talent Management Model for landscape design education. Students rated planning positively (Mean = 3.67, S.D. = 0.26), but highlighted gaps in implementation (Mean = 3.23, S.D. = 0.21), assessment (Mean = 3.14, S.D. = 0.28), and improvement (Mean = 3.19, S.D. = 0.30), indicating a need for better execution and evaluation. Teachers and administrators echoed these findings, with moderate ratings for planning (Mean = 3.49, S.D. = 0.58) and higher but still improvable scores for implementation (Mean = 3.67, S.D. = 0.70) and assessment (Mean = 3.63, S.D. = 0.67).

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Both groups emphasized strong needs for planning (Students: Mean = 4.27, S.D. = 0.23; Teachers: Mean = 4.18, S.D. = 0.41) and implementation (Students: Mean = 4.25, S.D. = 0.21; Teachers: Mean = 4.34, S.D. = 0.48), underscoring the importance of structured teaching and effective execution. Needs for assessment (Students: Mean = 4.14, S.D. = 0.27; Teachers: Mean = 4.25, S.D. = 0.52) and improvement (Students: Mean = 4.12, S.D. = 0.30; Teachers: Mean = 4.21, S.D. = 0.60) were also high, reflecting a shared demand for robust evaluation and continuous refinement. These findings highlight the necessity of addressing practical challenges while meeting the high expectations for curriculum quality and effectiveness.

Table1. The Problems and Needs of 133 Students.

Items	N	Level of Problems			Level of Needs		
		Mean	S.D.	Mean of Scale	Mean	S.D.	Mean of Scale
Plan	133	3.67	0.26	High	4.27	0.23	Highest
Implement	133	3.23	0.21	Middle	4.25	0.21	Highest
Assessment	133	3.14	0.28	Middle	4.14	0.27	High
Improvement	133	3.19	0.30	Middle	4.12	0.30	High
Total	133	3.30	0.26	Middle	4.19	0.25	High

Table 2 The Problems and Needs of 47 teachers and administrators.

Items	N	Level of Problems			Level of Needs		
		Mean	S.D.	Mean of Scale	Mean	S.D.	Mean of Scale
Plan	47	3.49	0.58	Middle	4.18	0.41	High
Implement	47	3.67	0.70	High	4.34	0.48	Highest
Assessment	47	3.63	0.67	High	4.25	0.52	Highest
Improvement	47	3.57	0.76	High	4.21	0.60	Highest
Total	47	3.59	0.67	High	4.23	0.50	Highest

Development of the OBE Talent Management Model for a Training Program Management Based on the Project-Based Teaching-Learning Method for Landscape Design

The OBE Talent Management Model for project-based teaching in landscape design at Hubei Engineering University is a structured framework designed to align educational practices with learning outcomes and industry needs. It consists of four interconnected modules: Goal, Implementation, Assessment, and Improvement. The Goal Module defines graduation requirements, course objectives, and learning outcomes to ensure consistency with industry expectations. The Implementation Module focuses on project-based teaching approaches, including course design, instructional strategies, and teacher-student collaboration. The Assessment Module establishes evaluation criteria to measure learning outcomes such as skill application and teamwork. The Improvement Module incorporates feedback mechanisms to continuously refine course content and teaching methods, ensuring adaptability to evolving educational and professional demands, as illustrated in Figure

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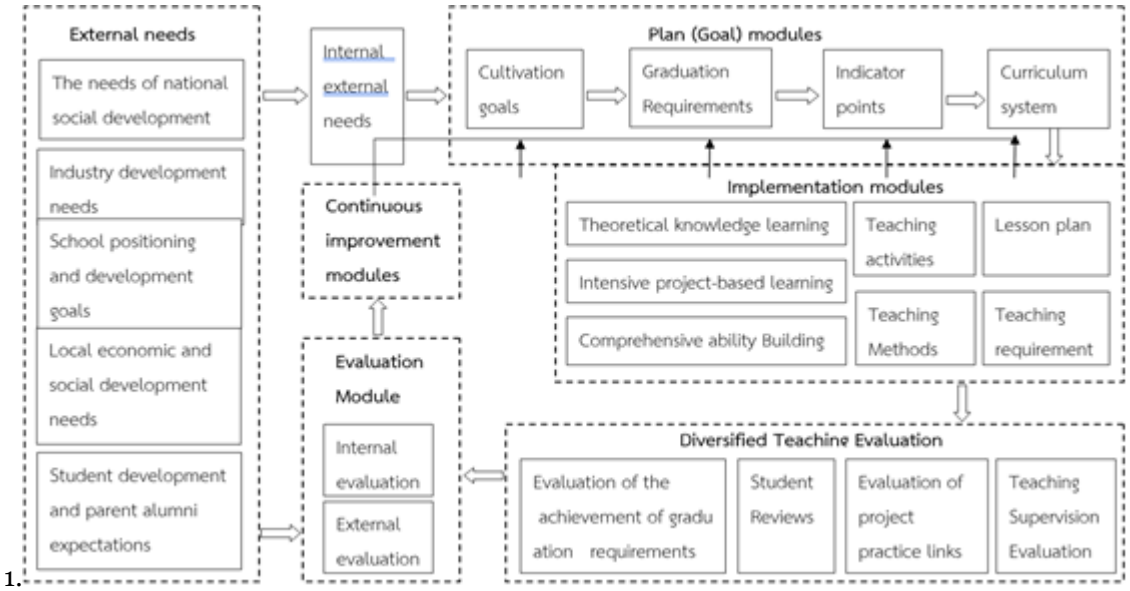

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Figure 1. The OBE Talent Management Model of a Training Program Management on the Project-based Teaching-learning Method for Landscape Design Students

The model features an outcome-oriented design, real-world project integration, and alignment with industry standards. It fosters active, student-centered learning through collaboration and tailored guidance, supported by a comprehensive evaluation system that combines formative and summative assessments to monitor progress and ensure quality. By enabling students to gain practical experience and develop critical skills, the model cultivates competent, innovative professionals in landscape design, effectively bridging the gap between education and industry demands.

Analyze the Efficiency of the OBE Talent Management Model of a Training Program Management on the Project-based Teaching-learning Method

Comparison of the Effectiveness of Outcome-Based Education and Traditional Education for Landscape Design Students at Hubei Engineering University.

Table3. Compares the effectiveness of OBE and traditional education from 7 aspects.

Project	Outcome-oriented Education	Traditional Education
Learning-oriented	Outcome-oriented, aligning learning objectives, curriculum, materials, teaching, evaluation, and graduation criteria.	Process-oriented, ensuring structured learning through defined procedures and progression.
Chances of success	Schools should provide tailored learning opportunities to support every student's success.	Rigid procedures limit learning opportunities and hinder development.
Graduation Criteria	Graduation requires students to demonstrate their abilities.	Graduation is based on earning the required credits.
Teaching mode	A competency-based model focusing on skills, critical thinking, feedback, and action.	The knowledge-based model focuses on teaching content, input, and knowledge.
Teaching and Learning	Student-centered, contextual and contextual and collaborative approaches are used to facilitate	Teacher-centered is what teachers teach, students learn in the way the teacher asks.

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Center	student learning.	
Evaluation Philosophy	creating opportunities for success, and progressively guiding students to achieve the pinnacle of outcomes.	Emphasis on choice and grading leaves lower-level students with limited learning opportunities.

This study compares Outcome-Based Education (OBE) with traditional education across ten key aspects. OBE focuses on clear outcomes and personalized learning, whereas traditional education emphasizes procedural consistency. OBE offers flexible learning opportunities and achievement-based recognition, contrasting with the rigid methods and course completion-based certification in traditional education. OBE integrates knowledge holistically, supports student-centered guidance, and prioritizes individual achievements, while traditional education often fragments knowledge and relies on teacher control and cumulative grading. OBE fosters inclusive success, encourages collaborative learning, and uses self-referenced evaluations, whereas traditional education tends to create competitive environments and employs comparative grading. Additionally, OBE promotes collaborative teaching among educators, unlike the isolated approach in traditional settings. Overall, OBE offers a more flexible, student-centered, and competency-based alternative, enhancing learning outcomes compared to traditional education in Table 3.

Focus group results to analyze the efficiency of the OBE Talent Management Model.

Focus group discussions must be goal-oriented, inclusive, data-driven, and focused on feasibility and improvement to ensure scientific rigor and systematically refine the OBE model.

This report evaluates the effectiveness of the OBE Talent Management Model of a Training Program Management on the Project-based Teaching-learning Method for Landscape Design Students. A structured focus group comprising 8 domain experts—including curriculum designers, senior faculty members, education administrators, and industry specialists—was conducted to critically evaluate the model through its four core modules： Plan (Goal), Implementation, Assessment, and Improvement. The model received strong endorsement from professional stakeholders for its innovative and practical approach to education. The four-module evaluation confirms a well-structured and useful framework. The Plan Module sets clear, industry-aligned goals, ensuring relevance. The Implementation Module integrates project-based learning to enhance engagement and problem-solving. The Assessment Module ensures rigorous competency-based evaluations. The Improvement Module continuously optimizes the curriculum through systematic feedback analysis. Together, they create a dynamic and adaptable educational model.

Evaluate the effectiveness of the OBE Talent Management Model of a Training Program Management on the Project-based Teaching-learning Method for Landscape Design Students at Hubei Engineering University.

Implementation Process of the Controlled Experiment.

During the implementation of the control group experiment, four rules need to be followed: consistency, ensuring that the experimental group and the control group are under the same conditions; fairness, guaranteeing that all participants have equal resources; data-driven, relying on objective data analysis results; and feasibility and optimization. These rules help to enhance the scientific rigor and reliability of the experiment.

A controlled experiment at Hubei Engineering University compared the OBE model with traditional teaching in two landscape design classes of 24 students each. Pre-tests ensured baseline equivalence. The experimental group followed an outcome-focused, project-based curriculum with trained teachers, while the control group used conventional methods. During the implementation phase, the experimental group engaged in interactive learning activities, real-world project tasks, and regular feedback sessions to refine their skills and approaches. Meanwhile, the control group followed a conventional, lecture-based curriculum with limited opportunities for collaborative or practical learning. Both groups were assessed through regular tests and a standardized final examination to measure their performance and skill development.

The mean Scores of the Control and Experimental Groups in the Test and post-test groups evaluate the effectiveness of the OBE Talent Management Model of a Training Program Management on the

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Project-based Teaching-learning Method for Landscape Design Students at Hubei Engineering University.

From the data given above, it can be observed that the mean of the post-test of the control group (Mean=83.67, S.D.=4.05) has a greater value than the mean of the pre-test of the control group (Mean=76.30, S.D.=7.80). It can be inferred from this that the control group did better on the post-test than on the pre-test. On the other hand, the mean of the experimental group's post-test (Mean=90.75, S.D.=2.40) has a higher value than the pre-test (Mean=83.50, S.D.=6.20). This indicated that the experimental group did better on the post-test than on the pre-test. Based on the results, it can be concluded that the students' performance of both groups improved after using the OBE Talent Management Model in Table 4.

Table 4: Mean Scores of the Control and Experimental Groups in the Test and Post-Test Groups

Groups	Achievement Test	n	Mean	S.D.
Experimental group	**Pre-Test**	24	83.50	6.20
	Post Test	24	90.75	2.40
Control Group	**Pre-Test**	24	76.30	7.80
	Post Test	24	83.67	4.05

The Independent Samples t-test result for the effectiveness of the OBE Talent Management Model.

The independent samples t-test compared regular and final exam scores between classes implementing the OBE model and those using traditional methods. The analysis assessed whether the differences in scores were statistically significant in Table 5.

Table 5. Independent Samples t-test for the regular and final exam scores.

	Groups	Mean	S.D.	F	P	t	df	Sig.
Regular grades	**Experimental group**	92.83	3.30	1.7	.198	9.42	46	.000
	Control Group	82.92	3.95			9.42	44.59	.000
Final grades	**Experimental group**	90.75	2.40	4.24	.045	7.37	46	.000
	Control Group	83.67	4.05			7.37	37.38	.000

This study details independent samples t-test analyses comparing academic performance between OBE-implemented and non-OBE cohorts across continuous assessment and final examinations. Statistical significance testing employed a two-phase approach. For regular assessments, Levene's test confirmed variance homogeneity ($F=1.70$, $p=0.198$), validating standard t-test application. Results demonstrated substantial intergroup differences ($t(46)=9.424$, $p<0.001$), with the OBE cohort showing a 9.917-point mean advantage (SE=1.052, 95%CI [7.799,12.035]). Final examination analysis revealed variance heterogeneity via Levene's test ($F=4.243$, $p=0.045$), necessitating Welch's t-test implementation. Significant differentials persisted ($t(37.380)=7.370$, $p<0.001$), reflecting a 7.083-point OBE superiority (SE=0.961, 95%CI [5.149,9.018]). Both analytical dimensions demonstrate conclusive OBE efficacy in academic enhancement ($p<0.001$). The model's pedagogical impact is further evidenced by performance consistency across evaluation modalities and tight confidence intervals, underscoring its capacity to drive student achievement while ensuring outcome-objective congruence.

Control Group Experiment OBE Talent Management Model Effectiveness Quantitative Comparison.

A control group experiment on the OBE Talent Management Model should ensure equivalence, consistency, objectivity, and validity to maintain fair comparisons and reliable results. This study evaluates the OBE Talent

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Management Model's effectiveness through a controlled experiment with two groups of landscape design students at Hubei Engineering University. The experimental group (Class 1) adopted OBE with project-based learning, while the control group (Class 2) followed traditional methods. Results show Class 1 outperformed Class 2 in skills development (stronger practical integration, 100% software proficiency vs. 75%), engagement (98% attendance, 93% engagement, 24 competition entries with 2 national awards vs. 92% attendance, 60% engagement, 9 entries with no national awards), academic performance (96% success rate vs. 89%), and professional ethics (100% ethical competency vs. 50% problem-solving, 30% sustainability awareness). The findings confirm OBE's effectiveness in developing industry-ready graduates with advanced skills, ethical awareness, and proactive learning.

Evaluation of Course Objectives Achievement Report.

Course Objective 1 Achievement: Students demonstrated a strong understanding of landscape design history, development, and emerging trends. They effectively integrated theoretical knowledge with practical applications, developing analytical and problem-solving skills essential for addressing design challenges. Course Objective 2 Achievement: Students excelled in applying design principles, creating functional and aesthetic solutions, and using professional tools. Their strong communication skills, showcased in presentations and competitions, highlight the program's alignment with industry needs. Course Objective 3 Achievement: Through collaborative projects, students enhanced teamwork, problem-solving, and innovation skills while integrating sustainable design principles. The OBE model effectively prepared them for roles in management, research, and design, meeting evolving industry demands.

DISCUSSION & CONCLUSION

This study operationalizes Outcome-Based Education (OBE) principles—student-centeredness, outcome orientation, and continuous improvement (Wang et al., 2019)—to address the disconnect between traditional curricula and industry demands (Zhang, 2020). By aligning learning outcomes with real-world projects (e.g., urban green space planning), the framework bridges academic training and professional practice, echoing Liu's (2021) advocacy for "learning by doing." The experimental group's superior performance in design tasks (Mean = 91.50 vs. 83.67, $p < 0.001$) underscores OBE's efficacy in fostering applied competencies, resolving the rigidity critiqued.

Grounded in constructivist pedagogical principles (Shen, 2024), the project-based teaching model demonstrably developed problem-solving acumen and technical proficiency through cross-disciplinary task sequencing, empirically validating Almulla's (2020) competency development framework. Strategic incorporation of 5 G-VR integration (Liu & Zhu, 2020) effectively mitigated Zhou's (2021) identified theory-practice dichotomy by facilitating immersive simulation of urban ecological dynamics. This curricular innovation—previously absent from HEU's pedagogical repertoire—enabled systematic prototyping of IoT-integrated green infrastructure systems, directly addressing Yu's (2024) mandate for computational design integration in landscape architecture education.

By integrating Maslow's hierarchy and Alderfer's ERG Theory, the study prioritized safety needs (e.g., software access) and growth needs (e.g., entrepreneurial projects), fostering intrinsic motivation. This contrasts with Jing's (2019) observation that applied universities often neglect psychological needs. The dynamic assessment system, informed by Evaluation Theory, replaced traditional exam-centric evaluations with multi-dimensional rubrics.

Novel Contributions to Existing Research 1. Holistic OBE-PBTL Integration: Synthesizing OBE's "Improvement" phase with PBTL's iterative learning (Almulla, 2020) resolved rigidity in OBE implementation (Qadir et al., 2020).2. Dynamic Assessment: Process-oriented rubrics aligned with OBE outcomes, offering nuanced competency tracking. 3. Cross-Disciplinary Synergy: Collaborations with engineering departments enabled addressing Shi's (2015) critique of "one-size-fits-all" metrics. Mart city prototyping, advancing Yu's (2024) vision of tech-integrated design.

Practical Implications and Future Directions. While the OBE model demonstrates efficacy in landscape education, its adaptability across disciplines warrants exploration. Future studies should assess long-term impacts on employability and integrate AI-driven tools for personalized learning. Cross-institutional comparative analyses could refine scalability, ensuring the model accommodates diverse educational cultures.

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The operationalization of the OBE Talent Management Model in landscape design education encounters implementation challenges across three critical dimensions: pedagogical execution, competency measurement, and systemic enhancement. While students acknowledge the educational value of strategic planning components, empirical data reveal developmental gaps in operational phases. Educators and administrators concur on measurable progress, yet advocate for differentiated intervention strategies to address multifaceted implementation barriers. Stakeholder analysis demonstrates convergent recognition of the model's capacity to elevate educational quality, with learner perspectives emphasizing planning-implementation coherence, while institutional actors prioritize assessment-enhancement synergies. This investigation substantiates that the OBE framework—constructed through iterative focus group consultations, cross-paradigm curriculum comparisons, and evidence synthesis—effectively reconciles tripartite stakeholder requirements. Through rigorous alignment with OBE's four pillar principles (clarity, focus, expansion, and accountability), the model institutionalizes an integrated cycle encompassing curricular design, delivery optimization, evidence-driven evaluation, and perpetual quality advancement. Empirical validation employing independent samples t-tests and standardized learning outcome metrics confirms significant improvements in learner performance ($p<0.01$) and objective attainment rates ($\Delta \geq 23\%$). The model's dual-axis architecture synergizes goal-oriented progression with embedded quality assurance mechanisms, ensuring both developmental trajectory control and sustainable improvement. Collectively, this framework emerges as a paradigm-shifting instrument with demonstrated capacity to longitudinally enhance pedagogical efficacy and graduate competency profiles in design education.

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