Research on the Construction of an Intelligent Workbench for Innovation and Entrepreneurship Education in Vocational Undergraduate Colleges Based on the ODDIE Model

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Abstract: Against the dual background of the deepening Mass Entrepreneurship and Innovation strategy and the acceleration of digital transformation, innovation and entrepreneurship education in vocational undergraduate colleges is urgently required to transition from knowledge imparting to capacity building. Taking the five - stage design thinking method as its theoretical core and integrating the data mining and intelligent decision - making capabilities of artificial intelligence technology, this study proposes the ODDIE Cycle Model to construct an intelligent workbench for the whole -life -cycle management of university students' innovation and entrepreneurship projects. The research focuses on solving three core pain points in current entrepreneurship education: superficial demand insight, fragmented decision support, and lagging iterative feedback. Through a three - layer intelligent architecture of Perception Layer - Cognitive Layer - Action Layer, it achieves data integration and intelligent empowerment for entrepreneurial projects, from opportunity identification to outcome transformation.

Keywords: Vocational Undergraduate; Design Thinking; Innovation and Entrepreneurship Education; Intelligent Management; ODDIE Cycle Model

1. Introduction

Currently, technological revolution and industrial transformation are intertwined, with innovation as the core driving force for development. The nation emphasizes the innovation - driven development strategy, and higher education is tasked with cultivating innovative talents[1]. Vocational undergraduate education aims to cultivate high - level technical and skilled talents, but its innovation and entrepreneurship education often focuses on theory over practice and results over process, struggling to meet the digital era's demands. Meanwhile, generative artificial intelligence technology is transforming education, offering new possibilities for personalized learning and intelligent decision - making[2]. Integrating AI into innovation and entrepreneurship education is crucial for breaking through traditional models and improving talent cultivation quality. [3].

2. Theoretical Basis

Design thinking is a human-centered innovation methodology[4]. Scholars from the Stanford University Institute of Design constructed the five stage process: Empathize, Define, Ideate, Prototype, and Test. Its core characteristics are human - centered, problem reframing, divergent and convergent thinking, and rapid iteration. The application of design thinking has expanded from product design to business innovation, organizational change, social innovation, and educational reform. In entrepreneurship education, it is an effective tool for cultivating innovative and problem solving skills[5], helping entrepreneurs identify opportunities and clarify thinking in uncertainty.

3. Current Challenges

3.1 Superficial Demand Insight

Traditional methods for identifying needs mainly rely on classroom observations, questionnaire surveys, or teachers' experiential judgments. These approaches have single data sources, low update frequency, and insufficient analytical depth, which makes it difficult to dynamically track the evolution of student interests and rapid market changes[6]. As a result, the selection of entrepreneurial directions lacks solid data support.

3.2 Fragmented Decision Support

When making decisions in the entrepreneurial

process, like market analysis, competitor research, business model validation, and risk assessment, students often rely on fragmented online searches or limited mentor consultations. There is a significant lack of systematic and structured intelligent decision support tools for these crucial steps.

3.3 Lagging Iterative Feedback
Due to untimely data collection during project execution, inadequate feedback mechanisms, and imprecise adjustment strategies, students find it difficult to identify problems and correct deviations promptly. This often causes them to miss the optimal adjustment windows, ultimately leading to project failure or inefficient operation.

4. Theoretical Explanation of the ODDIE Cycle Model
Based on the understanding of the design thinking five-stage process and reflection on innovation and entrepreneurship education practices, this study proposes the ODDIE Cycle Model as the theoretical framework for AI-empowered innovation and entrepreneurship project management(Figure 1). ODDIE is an acronym formed from the first letters of five English words: Observe, Design, Develop, Implement, and Evaluate. These five stages form a closed loop, with each cycle facilitating project iteration and upgrading.
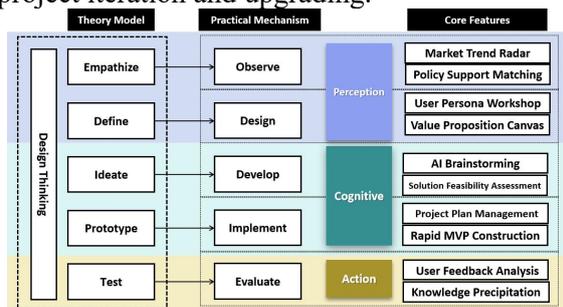
Figure 1. Intelligent Workbench for Entrepreneurship Management

4.1 Observe
Discovering problems worth solving. Opportunity insight, the starting point of entrepreneurship, focuses on identifying unmet market needs or underutilized resources. It corresponds to the Empathize stage of design thinking, emphasizing immersion in user scenarios. AI empowerment can enhance the efficiency and depth of opportunity insight.

4.2 Design
Defining goals worth pursuing. Based on identified opportunities, this stage transforms opportunities into clear goals and clarifies the value and its target. It corresponds to the Define stage, emphasizing precise problem - definition and clear value - proposition. AI can support with user persona construction to help students profile users and formulate value positioning.

4.3 Develop
Creating possible solutions. The core is idea generation and solution design to explore value creation. It corresponds to the Ideate stage, emphasizing thinking, evaluation, and optimization of feasibility. AI can join brainstorming and perform feasibility assessments.

4.4 Implement
Transforming solutions into reality. This stage's task is to convert the solution into a prototype or minimum viable product (MVP) for market validation[7]. It corresponds to the Prototype stage, emphasizing rapid realization and low-cost trial and error. AI can assist with task decomposition and collaborative management, provide guidance and tool recommendations for prototype creation.

4.5 Evaluate
Learning and evolving from feedback. The verification and evaluation stage is key to the closed loop, focusing on collecting feedback, assessing progress, summarizing experiences and planning actions. It corresponds to the Test stage but emphasizes data-driven evaluation and iterative decision-making more. AI can automatically collect and analyze user feedback and consolidate project experiences into knowledge assets.

5. System Architecture Design
Based on the ODDIE cycle model, the system is divided into three main layers: the Perception Layer, the Cognitive Layer, and the Action Layer. These correspond to the three functional domains of data collection and integration, intelligent analysis and decision support, and task execution and collaboration, respectively. The layers are relatively independent yet closely interconnected.

5.1 Perception Layer

5.1.1 Market trend radar

The system automatically crawls multi - source data like industry research reports, financial news, and social media discussions[8]. Then, it uses natural language processing technology for semantic analysis and generates visual heat maps of market trends. Students can intuitively see heat changes in different industries, emerging sectors' rise, and potential market gaps. Moreover, the system supports filtering and comparison by region, time, and industry, which helps students find entrepreneurial directions matching their professional background and local resources.

5.1.2 Policy support matching

The system tracks real-time policy information released by governments at national, provincial, municipal, and district levels. It uses text analysis to extract key points and builds a policy project matching matrix. After students input project basics, the system automatically matches applicable policies and recommends them by relevance. Meanwhile, it offers auxiliary info for each policy, including application condition interpretation, process guidance, material lists, and historical application data analysis, to help students boost policy application success rates.

5.1.3 User persona workshop

The system offers structured user research frameworks and intelligent data - analysis tools to help students understand target user groups deeply. Students can design and publish online questionnaires via the system, which automatically collects and analyzes data. They can also upload user interview records, and the system extracts key information using natural language processing technology to identify user pain points and need hierarchies. After multi dimensional data integration and analysis, the system automatically generates user persona reports that cover demographics, behavior habits, psychological appeal, and consumption decisions.

5.1.4 Value proposition canvas

Drawing on the Business Model Canvas concept, the system provides an interactive value proposition design tool. Students sequentially fill in elements on the canvas, such as target customers, customer jobs, pains, gains, products/services, pain relievers, and gain creators. The system checks the logical consistency of elements in real-time, highlighting contradictions or omissions. An AI assistant participates in the discussion and optimization of the value proposition, asking questions, making suggestions, and providing examples based on the entered content. The final value proposition canvas becomes the core positioning document for the project, guiding subsequent product development and market promotion.

5.2 Cognitive Layer

5.2.1 AI brainstorming

The system is equipped with a built - in AI idea generation engine that supports various creative stimulation modes: In divergence mode, the AI rapidly generates numerous idea directions around a given theme or problem [9], assisting teams in broadening their thinking and breaking patterns. In analogy mode, the AI searches for solutions to similar problems in other industries or fields, inspiring new ideas through cross - border analogy. In combination mode, the AI randomly or based on rules combines existing idea elements to explore new possibilities. In optimization mode, the AI offers improvement suggestions for existing ideas from perspectives such as feasibility, innovativeness, and economy.

5.2.2 Solution feasibility assessment

After an idea evolves into a relatively comprehensive solution, a systematic feasibility assessment is necessary. The system offers a multi dimensional assessment framework that encompasses key dimensions such as technology, market, finance, team, and legal compliance. After students input relevant solution information as guided, the AI generates a feasibility assessment report based on the built in assessment models and external reference data. The report presents the assessment results in the form of scores, charts, and textual explanations, highlighting the solution's strengths and weaknesses and offering improvement suggestions for the weak areas.

5.2.3 Project plan management

The system offers project planning and management tools, students can break down the project into phases and tasks, set timelines and assign responsible persons. The system then automatically generates progress overviews and issues warnings. The AI assistant recommends plan templates and provides scheduling suggestions based on the project type and team situation. During the execution phase, the system tracks task completion in real - time, automatically alerts about delayed or off - plan

tasks, and analyzes their causes and impacts.

5.2.4 Rapid MVP construction

For projects needing product prototypes, the system provides guidance and tool support for rapid MVP construction. Meanwhile, the AI assistant can suggest development tools and technical solutions for specific MVP requirements and offer technical Q&A during development. For students without a technical background, the system recommends low - code/no - code tools to lower the technical threshold of prototype development.

5.3 Action Layer

5.3.1 User feedback analysis

User feedback is a crucial basis for product iteration. The system provides multi-channel collection tools for user feedback, including in-app feedback, questionnaires, social media monitoring, and customer service record analysis. The system generates user feedback analysis reports, presenting key information such as user satisfaction trends, high-frequency feedback issues, and typical user voices, helping teams quickly grasp changes in user needs and clarify product optimization directions. For urgent or severe user issues, the system automatically flags and notifies the relevant responsible person.

5.3.2 Knowledge precipitation

The system automatically structures project - related content like documents, data, etc., forming a knowledge archive in the form of a knowledge graph, which supports semantic search and associative recommendations. After a project ends, it guides the team in review and summary, extracting experiences and lessons. The team uses the report to plan the next phase, starting a new ODDIE cycle. These experiences and lessons are added to the platform's knowledge base for other teams to learn from[10]. The continuous accumulation of the knowledge base provides data for AI model optimization.

6. Conclusion

This research is based on the practical needs and contemporary context of innovation and entrepreneurship education in vocational undergraduate colleges. It addresses three core pain points in current education - shallow demand insight, fragmented decision - making support, and delayed iterative feedback, and innovatively proposes the ODDIE Cycle Model.

Based on this model, it designs an intelligent workbench for the whole - life - cycle management of students' innovation and entrepreneurship projects. In the future, exploring the application of more advanced AI technologies like multimodal understanding and generation, knowledge reasoning and planning, and personalized learning and adaptation in the workbench could further improve the system's intelligence.

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