A Study on the Construction of the "Six-Element Synergy" Teaching Model of Vocational Undergraduate English Driven by Large Language Models

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Abstract: *With the development of technology for large language models, many kinds of English teaching materials for vocational college students have been created, and at the same time, the demand for cooperation among various parties has also risen. The main goals of this paper are to cultivate students' language proficiency, enable them to use professional language skills effectively, foster independent learning in the course of vocational college English classes, and put forward a teaching model based on large language models and the "Six-Element Synergy". Based on the above research, it has been determined that large language models have certain technical features that are in line with teaching demands, the combined purpose of teaching has been explored, and the "Six-Element Synergy" method is better than traditional teaching methods. Based on the above, this paper will examine the distributed reconstruction of teaching subject roles, the multimodal integration of resources, and the collaborative organisation of activity chains to build a structural framework at the goal level, element level, interaction level and support level. Research will be conducted on the intelligent-driven teaching decision-making mechanism and some directions for extending teaching interaction to provide a theoretical basis and explanation for the working process of the systematic reconstruction of vocational undergraduate English teaching.*

Keywords: *Large Language Models, undergraduate English at vocational colleges, six-element synergy, teaching model, intelligent-driven, teaching system*

Introduction

The two goals of teaching English at the vocational college level are language ability and vocational skills. The characteristics of teaching goals are as follows: they should be both general and specific, the demand for linguistic cognition needs to be in line with that of contextual cognition, and autonomy cultivation should be combined with technology empowerment. Therefore, the old model of a single subject, fixed resources and linear processes has structural flaws. Large Language Models have the attribute of storing information and answering all kinds of questions quickly, so a cooperative construction model can be employed in the classroom. Technology embedding alone cannot achieve paradigm innovation, and the main problem in building a teaching model lies in the collaborative integration of multiple subjects, all kinds of resources and many links. The "Six-Element Synergy" teaching model put forward in this paper integrates teachers, students, intelligent agents, industry mentors, learning communities and curriculum developers to build a cooperative subject network; it combines preset and generative resources and sets up an operating mechanism for diagnosis, evaluation and feedback on the teaching process to provide a theoretical basis for the systematic reconstruction of the teaching system and achieve all kinds of teaching goals.

1. The Logical Starting Point for the Reconstruction of Vocational Undergraduate English Teaching Forms

1.1 Analysis of the Technical Features of Large Language Models for Teaching Embeddings

1.1.1 Alignment of Semantic Coherence Maintenance Ability and Contextualized Language Acquisition

Large Language Models have been able to remember the information in the previous turns of a conversation and thus keep track of the logical structure of language and changes in topic during interaction. The above reasons will help to achieve the goal of contextualised language teaching in vocational college English classes. Use the technical system to experience all the stages of context construction, maintenance and transformation, and learn how linguistic forms are used in all sorts of contexts of simulated real-life language situations.

1.1.2 Dynamic Adaptive Input Mechanism and Fine-Grained Responses to Different Learners

A technical mechanism that can adjust the complexity of the input text and the density of professional terms in real time according to the language production characteristics of learners will help large language models overcome the limitations of traditional teaching materials in terms of individualisation. Vocational undergraduate English teaching has many diverse and flexible characteristics, so we can make full use of them to meet the large differences among students in terms of their language foundation, professional background and learning speed, and adjust the level of language input accordingly.

1.1.3 Multi-dimensional Real-time Feedback Function and the Refined Cultivation of Language Skills

The many types of evaluations for students' language production by large language models include the correctness of grammar, fluency and expression, suitability of style, and proper use of professional terms. Promptly give the students specific information on how to improve their English in the vocational college English class; after the students produce language, any problems can be immediately corrected, and thus a closed-loop training cycle of "output-feedback-correction" can be formed.

1.2 Analysis of the Composite Characteristics of Vocational Undergraduate English Teaching Objectives

1.2.1 Integration of Generality and Specialisation in the Dimension of Language Competence

The teaching goals for English at vocational colleges are twofold in terms of the level of language proficiency: general language ability and the ability to use language in professional situations. The relationship between the two is not one of simple succession or hierarchy; rather, they should be integrated in the teaching system. General language proficiency can help students apply what they have learned in daily life and studies, and the application ability of professional and domain-specific language can help them communicate effectively in technical areas and cooperate with colleagues.

1.2.2 Synergy of Linguistic Cognition and Contextual Cognition in the Cognitive Dimension

The teaching goals of vocational undergraduate English at the cognitive level are to achieve the following three levels: mastering the system of linguistic symbols, expressing professional knowledge in language, and understanding language norms in vocational situations. Linguistic cognitive ability is the foundation; professional cognitive ability helps to integrate and transform knowledge and language; contextual cognitive ability allows learners to understand and apply the rules of language use in all kinds of vocational situations. The combined attributes of the three types of thinking are considered to be the teaching goals at the cognitive level.

1.2.3 Cultivation of Autonomy and Technology Empowerment in the Dimension of Competencies

Another goal of teaching English at vocational colleges is to help students learn how to study independently; that is to say, how well they can organise their own study in a technology-assisted classroom, such as self-study, self-assessment, self-regulation and extension of learning. The goal of this competency objective is to meet the basic demands of the vocational field for continuous learning ability among practitioners, and at the same time, it is in line with the personalised learning paths and adaptive learning support provided by the technological system.

1.3 Breakthrough of the "Six-Element Synergy" Concept Over the Traditional Teaching Model

1.3.1 Transcendence of the Binary Opposition Structure through Multi-Synergy in the Subject Dimension

According to the idea of "Six-Element Synergy", a cooperative operating subject network has been established to break the traditional division of teaching and learning, and this network includes teachers, students, intelligent agents, industry mentors, learning communities and curriculum developers. All subjects have different goals in the process of teaching, and by means of cooperation and coordination among themselves, they help to achieve the goals of education by forming a distributed network of subject relationships rather than a single line of transmission and reception.

1.3.2 Breakthrough of the Monopoly of Preset Resources through Dynamic and Static Integration in the Resource Dimension

First, collect all kinds of materials and combine them with the current resources, such as textbooks, generated materials, contextual resources, interactive resources, industry corpus materials, etc. Static and dynamic resources should be used together; preloaded content and generated content can be converted into one another to form a multi-source convergence mechanism in the resource ecology, and teaching resources should be changed from a closed preset system to an open and evolving one[1].

1.3.3 The Resolution of the Separation between Evaluation and Teaching through the Embedded Integration in the Evaluation Dimension

The idea of "Six-Element Synergy" is to integrate diagnostic assessment, formative assessment and summative assessment and move away from the old way of separating assessment from teaching. No longer will there be an assessment at the end of the lesson; instead, continuous assessment will be carried out all the time during the teaching process. Collect and organise the evaluation data from all quarters to keep up with the changes in students' language skills and address any problems in time.

2. Element Structure and Interaction Mechanism of the "Six-Element Synergy" Teaching System

2.1 The Distributed Reconstruction of Teaching Subject Roles

2.1.1 The Change in Teacher Roles from Knowledge Broadcaster to Collaborative Guide

According to the "Six-Element Synergy" model, teachers should take the initiative to lead the teaching team, jointly set learning goals, create a good learning atmosphere, manage students' interaction among themselves, and lead moral education. Teachers need to know the working logic of the technological system, when to integrate various subjects in their teaching, and make timely decisions to flexibly change the course of instruction; they will be the core links of the distributed subject network.

2.1.2 The Functional Transition of Intelligent Agents from Tool Attributes to Interactive Subjects

Intelligent agents based on large language models are no longer limited to the function of technical support for the "Six-Element Synergy" system; now many other kinds of subjective roles have been added, such as language-interaction partners, learning-path planners, instant feedback providers, etc. According to the semantics and cognition of students' language production, intelligent agents will develop personalised communication strategies and study recommendations to speak with them more effectively. Function division can be used to organise the various functions of intelligent agents in the teaching system somewhat independently, and these agents can work together to achieve all kinds of goals by cooperating with other courses.

2.1.3 The Collaborative Embedding Mechanism of Learning Communities and Industry Mentors

The purpose of a learning community should be to build a horizontal support network for students, and in accordance with the "Six-Element Synergy" system, promote peer interaction, joint creation and sharing of experiences. At the same time, industry mentors can offer professional advice on the problems of authenticity and normativity in the use of vocational language, and they can also introduce language-use standards from the industry field into the teaching system. The two kinds of subjects in the collaborative embedding for the operation of the system are: the learning community offers a practical place for the guidance of industry mentors, and in turn, industry mentors provide professional orientation for the activities of the learning community; thus, a subject structure has been established

where vertical guidance and horizontal collaboration mutually support each other.

2.2. Integration of Multiple Modalities and Adaptive Teaching Materials

2.2.1 Semantic Integration of Textual, Speech and Image Resources

The teaching system of "Six-Element Synergy" uses a large language model to integrate multimodal resources at the semantic level and has unified the semantic representation of textual resources, speech resources and image resources. Textual resources have conceptual knowledge and logical structure; speech resources are perceptual input in the form of sound; image resources provide context and spatial relations. The three kinds of resources are related and complementary at the level of semantics to form a multi-dimensional type of resources that goes beyond the limits of a single modality and provides many channels for learners to obtain language input and engage in cognitive processing.

2.2.2 The Dynamic Transformation Mechanism of Preset Resources and Generative Resources

At the same time, some teaching materials will also be created in the system based on the pre-loaded resources. Preset resources provide the basis and content support for teaching activities, and as a result of interaction during the teaching process, generative resources are continuously created and added to the resource system; after filtering, organising and integrating these resources, they become effective resources that can be used in the next lesson. Therefore, the teaching-resource system will continue to be expanded and improved, and with the deepening of teaching interaction, so too will the resources themselves be continuously added to and optimised[2].

2.2.3 The Transformation Path of Industry Corpus Resources into Teaching Materials

Vocational undergraduate English teaching is based on industry corpora, so the system should be able to process the resources in these industry corpora and generate teaching materials effectively. Large Language Models have been trained on and have learned the characteristics and parameters of the industry language from specific industry corpora, such as patterns in the use of terminology, preferred syntactic structures and stylistic features, etc., and have embedded these features in the generation of teaching materials. Therefore, the teaching materials will be in line with the language that people use in their daily work and study, and the demand for resources at the level of vocational education will be better met.

2.3 Collaborative Organisation and Regulation of the Teaching Activity Chain

2.3.1 The Closed-Loop Structure of Teaching Links and Their Interactive Coordination

The six links of the teaching system are task design, interactive activities, collaborative learning, instant feedback, evaluation and diagnosis, and teaching regulation; together they form a closed-loop structure, are all nonlinear, and coordinated. Task Design provides the basis for interactive activities, and behaviour data obtained from the interaction of students can be used to adjust or modify teaching in light of the evaluation results; thus, there is a self-regulating loop of task design.

2.3.2 Functional Articulation of Multiple Subjects in the Activity Chain

Joint organisation of the teaching activity chain requires the functional coordination of all links in various subjects, such as teachers, intelligent agents, learners and industry mentors. Teachers will be in charge of leading the design of tasks and regulating the links in teaching; intelligent agents will be responsible for the functions of immediate feedback, assessment and diagnosis; learners will take the initiative in interactive activities and collaborative learning; and industry mentors will provide professional reference standards in the areas of assessment and diagnosis. All kinds of subjects have different divisions of labour at all links, and these subjects also cooperate with each other to form a mechanism of functional integration for the whole operation of the activity chain.

2.3.3 Self-Adaptive Regulation and Path Optimisation of the Activity Chain

Based on the analysis of learner behaviour data by large language models, the working conditions for the chain of teaching activities will be adjusted dynamically according to changes in this data. When a student does not understand what is being taught or loses interest in a certain part of the class, alter the method of teaching, reduce the difficulty of the content, or adjust the speed of interaction in the next few minutes to attract their attention again. The first way to avoid a rigid and fixed chain of teaching activities is to build a system of self-regulation; otherwise, it will be difficult to respond flexibly to changes in students' actual circumstances and meet their different needs at various times.

3. Structural Design and Operating Mechanism of the "Six-Element Synergy" Teaching Model

3.1 The Structural Framework of the Teaching Model and Hierarchical Correlations

3.1.1 Integration and Unification of Multidimensional Teaching Demands According to Goal Levels

The Goal Level is the highest level in the Design of the teaching model framework, and it contains four kinds of goals: development of language proficiency, application of professional language, development of cognitive synergy, and cultivation of learning autonomy; it also sets out the hierarchy and transformation path of the sub-goals. At this time, we will set the direction for the operation of the teaching system and establish standards for the construction and evaluation of the subsequent stages.

3.1.2 Functional Positioning and Configuration Relationship of Multiple Components at the Element Level

The six basic parts at the element level are Subject, Resource, Context, Path, Evaluation and Feedback, and they all have different functions. The subject component is to lead the teaching activities; the resource component is to provide material support; the context component is to create a good learning environment for students; the path component is to plan the steps of implementation; the evaluation component is to determine the results of learning; and the feedback component is to adjust teaching based on this information. The six kinds of components are arranged to work together, and the operation of one component requires the cooperation of all the other components.

3.1.3 Bidirectional Coupling Mechanism of the Interaction Level and the Support Level

The level of interaction refers to the dynamic interaction and cooperation among the six types of teaching elements, and the support level includes the technical support system and the mechanism guarantee system; together they provide the infrastructure and rules for the operation of the level of interaction. The two levels are connected bidirectionally; the support level specifies the range and type of operation for the interaction level, and demand information obtained during the operation of the interaction level is used to drive optimisation of the system and modification of rules at the support level[3].

3.2 The Intelligent-driven Teaching Decision-making and Dynamic Regulation Mechanism

3.2.1 Semantic Analysis and Diagnosis of Learning Behavior Based on Data

Large Language Models are used to conduct semantic analysis of the behaviour data produced by learners during interaction, such as language input, question-and-answer records and task performance, in order to extract performance features in the dimensions of language accuracy, expressive fluency, normative use of terminology and stylistic appropriateness. Based on the sequence of multi-round interaction data, this paper will track the development of students' abilities in learning and identify any difficulties they may encounter during their study of Chinese at various times[4].

3.2.2 Teaching Path Planning Based on the Aggregation of Multi-source Information

The intelligent-driven mechanism will collect and organise all kinds of data from many places, such as the diagnostic results of students' current abilities, teaching goals, conditions of available materials and time, etc., to build all sorts of plans for teaching paths that meet all these demands. Path planning is to set the sequence of content, choose all sorts of activities, determine the frequency of interaction, organise support measures, etc., to create personalised teaching plans based on the differences among students, and it can be adjusted in real time according to changes in the students' circumstances.

3.2.3 Timing Selection and Strategy Generation for Teaching Intervention

According to the predicted learning conditions and development trends of the students, an intelligent mechanism will know when teaching intervention is required and generate an appropriate teaching plan. The intervention strategies are to provide cognitive scaffolds, adjust the difficulty of the tasks, change the mode of interaction, optimise the form of resource presentation, and select strategies according to the current situation of the learners so that teaching regulation actions can be effectively implemented at times when learners have urgent needs.

3.3 Multi-directional Expansion and Ecological Development of Teaching Interaction

3.3.1 Interactive Integration of the Classroom Field and Virtual Space

Classrooms are no longer the traditional places for teaching; now they are virtual interactive environments. The classroom field is for face-to-face interaction among teachers and students, as well as peer collaboration; the virtual space can expand the time and place of teaching and learning, promote continuous communication among learners and intelligent agents, learning communities and industry mentors, and thus achieve close integration of centralised classroom learning and distributed extracurricular learning[5].

3.3.2 Integration and Permeation of Vocational Contexts and Teaching Contexts

Through all sorts of means, such as modifying the resources in the industry corpus, adding features of vocational language, and having industry mentors participate, the teaching model has achieved the integration and diffusion of vocational contexts in teaching. During the course of teaching, language-use rules, communication norms and professional vocabulary systems in vocational education will be introduced to ensure that the forms of language learned by students are in line with those in the vocational industry. The language skills learned in the teaching environment are then applied and enhanced in vocational context simulation activities[6].

3.3.3 The Evolution Trend of the Teaching System towards an Open Ecosystem

With the continuous development of education, the teaching mode has changed from a closed-system model to an open-system teaching ecosystem. As the boundary of the system has been continuously shrunk, external resources and subjects have been added to the system one by one, and the network of internal interaction has become increasingly complex and diverse. Learners will be changed from passive receivers of knowledge to active builders of the system; data on their learning behaviour and interaction will be used to improve the system, and through continuous self-organisation, the form and function of the teaching model will be adjusted.

Conclusion

Systematically construct the "Six-Element Synergy" teaching model for vocational undergraduate English driven by large language models in three parts in this paper: the logical starting point of teaching form reconstruction, the element structure and interaction mechanism of the teaching system, and the structural design and operational mechanism of the teaching model. Based on the above results, we can conclude that the technical features of large language models are in line with the teaching goals of vocational undergraduate English, and thus, breakthrough paths for the "Six-Element Synergy" can be established in the areas of subject, resources and assessment. At the level of the structure of elements, this paper provides the distributed reconstruction of teaching subject roles, multimodal integration and dynamic adaptation of resources, and the collaborative organisation and regulation mechanism of the teaching activity chain. In terms of the construction of the model, the four levels in this study are the goal level, the element level, the interaction level and the support level; together, they explain the intelligent-driven teaching decision-making mechanism and the various extensions of teaching interaction. Future research can explore the operating conditions and adaptation mechanisms of this teaching model in various environments, investigate the different demands of different professional fields and stages of learning, and study the development path of the form of the teaching model in light of the progress of large language model technology.

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