Research on the Mining and Integration Strategies of Ideological and Political Elements in Academic English Courses for Science and Engineering Majors

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Abstract: *Academic English courses for science and engineering take disciplinary discourse as its teaching carrier. Its multidimensional value elements (scientific spirit, academic ethics, scientific and technological humanities, and intercultural communication), which are natural resources for cultivating values in the course. Focuses on the identification and integration strategy of ideologies and political elements in this course; constructs a classification system for four types of elements, reveals the text dependence and context sensitivity of ideological and political elements in academic discourse, proposes a multilevel identification framework covering both teaching content and teaching stages. On the basis of identification elaborates how to implement the strategies through integration pathways including teaching objectives, content, and methods, constructs a three-dimensional evaluation framework covering language, value, and cognition and a continuous improvement mechanism. To provide systematic analytical tools and instructional design references for developing value connotations of academic English courses for science and engineering.*

Keywords: *academic English for science and engineering; ideological and political elements in the course; identification strategies; integration strategies; teaching evaluation*

Introduction

The teaching of academic English courses for science and engineering focuses on authentic academic discourse that students face some issues about research ethics, academic norms and scientific and technological responsibility while reading and writing academic texts. But such teaching is only limited to technical discussion about language skills without a systematic awareness of value connotations embedded in academic discourse or any effective response from the perspective of instructional design. How can we turn the value elements in academic discourse into practical teaching resources whilst keeping its knowledge logic and the main line of language training? The present study attempts to identify types of ideological and political elements; modes of their presence in discourse; integration pathways and effect evaluation to give it theoretical grounding and operability for developing the value connotations of academic English courses for science and engineering.

1. Classification System and Identification Pathways of Ideological and Political Elements in Academic English Courses for Science and Engineering

1.1 Basic Types and Characteristics of Ideological and Political Elements in Academic English Courses for Science and Engineering

The ideology and politics in academic English courses for science and engineering has unique existence form than general English course, its teaching carrier is disciplinary discourse. We can find out through teaching practice that the ideological and political elements existing in academic English courses for science and engineering roughly includes four basic types: elements of scientific spirit which embodies truth-seeking attitude and rigorous logic contained in the argumentative structure of academic discourse. The what we see by reading papers or understanding experimental design is exactly this evidence-based cognitive paradigm; elements of academic ethics center on some parts of discourse like present research data, attributing research outcome and citing literature, point at the norm and responsibility awareness of academic activity; elements of science and technology humanities refers to the intersection between science and technology with social needs, academic discourse will

imply a certain value presupposition about the boundary of application and direction of development when talking about technological progress; intercultural communication elements comes from the basic attribute of academic English as an international lingua franca involved in dialogues among different academic traditions and adjust academic identity.

These four kinds of elements usually interweave and co-exist in a single academic discourse, so they do not have a strict separation between them; instead, we use an analysis tool when doing the identification work. They differ from one kind of elements to another with respect to their presentation density and explicitness in discourse – elements of scientific spirit are mostly embedded into the argumentative structure while those of science and technology humanities depend more upon the thematic domain and problem awareness of discourse. The accurate grasp of the features of every type as well as their internal connections is the epistemology prerequisite for conducting systematic identification work and it's the classification basis for designing subsequent integration strategies[1].

1.2 Text Dependence and Context Sensitivity of Ideological and Political Elements in the Course

The majority of teaching materials in academic English courses for science and engineering have authentic academic discourse whose ideologies and political elements are implicit instead of obvious thematic statements—more often hidden under the argumentation logic, knowledge construction process or disciplinary cultural convention of the discourse. As regards texts, how academic papers cite previous work while presenting their research background; what strategies they employ to present data while reporting experimental results and the argumentative pathways justifying the importance of the problem when discussing the research significance all represent different degree of some academic value orientation and cognitive stance. To identify the ideological and political elements we need go deep into the micro-structure of discourse paying attention to the relation between lexical choice, syntactic organization and rhetoric strategies and meaning construction but it should not stop at a rough grasp of the theme of the text.

Context-wise, the same academic text has dramatically different ideological and political connotation according to the teaching context (for instance, if we emphasize guiding students to analyze the rigor of the research methods when we teach an academic paper about a technological breakthrough, then elements of scientific spirit are emphasized whereas if we focus on discussing the social application scenarios of the technology as part of our teaching, elements of science and technology humanities will be activated), context sensitivity refers that the meaning of ideological and political elements is not a fixed quality intrinsic in the text, which emerges from and manifests itself by the interaction between the structural form of the text and the teaching context. Text dependence refers to the material basis for ideological and political elements in discourse structure, while context sensitivity refers to their meaning generation mechanism in teaching practice, they form a dialectical unity; identification work needs to consider the internal structure of the text and the external context of teaching at once[2].

1.3 Multilevel Identification Strategies Spanning Teaching Content and Teaching Stages

Based on the above analysis about the type characteristics and mode of existence of ideological and political elements, we should conduct collaborative identification of ideological and political elements in academic English courses for science and engineering based on both dimensions (content dimension) and stages (stage dimension). Based on the content dimension, we need to take the thematic domain, knowledge structure and discourse feature of academic discourse as an entry point to identify ideological and political resources with a differential sort. In general terms, academic English courses for science and engineering include disciplines or academic skills modules; the density of elements of scientific spirit and academic ethics is high in literature reading modules but that of academic norms and intercultural communication is prominent in academic writing modules, whereas the space for presenting elements of science and technology humanities is relatively broad in academic presentation modules. Taking differentiated priority of identification according to module characteristics will increase the pertinence and effectiveness of identification.

With regard to the teaching stage dimension: The Identification work spans all the process of pre-class preparation, classroom implementation and post-class extension; choosing academic reading materials and designing questions before class is an important node of initial identification of ideological and political elements, enabling teachers to identify developable ideological and political resources from teaching materials and turn it into actionable topics for classroom discussions. For the

classroom implementation stage, we focus on achieving deep interpretation of ideological and political elements in teacher-student interaction and discourse analysis so that students can raise the value connotations implicit in texts from the subconscious level to the level of conscious awareness under guidance by asking questions. With respect to the post-class extension stage, we focus on transfer and application of ideological and political elements via writing tasks or project activities prompting students to internalize the value issues they encounter when doing productive tasks. Content dimension and stage dimension are cross-nested, thus raising the identification of ideological and political elements from an experiential operation to a systematic instructional design activity[3].

2. Integration Strategies for Ideological and Political Elements in Academic English Courses for Science and Engineering

2.1 Integrative Design of Teaching Objectives

Traditional goals for academic English courses in science and engineering: cultivate academic language competence (reading professional literature, academic writing, academic communication), but integrating systematic ideology and politics doesn't add new objective items on top of the original ones —it's an internal relation between language competence objectives and value cultivation objectives. The theoretical basis of integrating design lies in the fact that we weave meaning construction with value judgment when learning academic English—the understanding of academic discourse inevitably leads us to discuss such things as research ethics or scientific and technological responsibility. By incorporating these issues while thinking about setting objectives by teachers can make ideologies and political elements from random and accidental teaching behaviors become conscious instruction design.

The specific integration path of teaching objectives is as follows: Language focus on understanding and production of academic discourse (the foundational objective of academic English courses), cognitive level focuses on development of critical thinking and academic judgment that points out students' ability to identify the quality of academic argumentation, reasonableness of research design and normativity of data presentation, value level focuses on cultivating scientific spirit, academic ethics and awareness of science and technology humanities whose objectives does not exist outside of language learning but runs through the process of reading, analysis and production of academic discourse. Three levels support each other – improvement of language competence gives a tool basis for cognitive activities and value exploration, enhancement of cognitive competence promotes sensitivity to the value dimension in discourse. Cultivation of value awareness provides a direction of meaning for language and cognitive activities.

2.2 Organic Embedding and Thematic Organization of Teaching Content

Basic materials utilized by academic English courses for science and engineering are authentic academic discourse, which unavoidably become carriers for embedding ideology and politics. The secret of integration does not lie in disturbing the knowledge logic and main line of language training in academic English teaching, but organically integrate ideological and political elements into the current framework of teaching content. Thematic domain of academic discourse itself is an important gathering place for ideological and political resources—the topics of scientific and technological ethics, academic norms, innovation-driven development, and sustainable development have both academic inquiry value and value cultivation function; constructing teaching modules based on these themes so that each module carries out the language training task of academic English at the same time provides the theme space for value exploration is a feasible way for content integration. The thematic mode of organization avoids scattered embellishment of ideological and political elements and acquires its structural position in the course content system[4].

Selection and development of teaching materials shall follow the principle of organic embedding. The differences exist among various academic discourses regarding their suitability for performing ideological and political integration – teachers should consciously lean towards those which have both academic value and space for value exploration when they screen teaching materials; e.g., there is a huge difference between an academic paper discussing dilemmas in research ethics vs just a pure technical specification in terms of their potential for ideological and political integration. Distinguish the role of the same text during different teaching stages – the former can be used as reading material to perform a demonstrative function at the cognitive level but others may better serve as topic starting point for writing tasks to perform a production-oriented function. Gradient design of teaching materials

according to the needs of ideological and political integration will help us precisely embed it at the level of teaching content[5].

2.3 Contextualized Embedding and Activity Design of Teaching Methods

Teaching method links together content design with learning outcomes; it can't be independent preaching or add-on indoctrination for integrating ideological and political elements, but rather infiltratively embedded within context-based teaching activities. Academic English teaching has the characteristic of being task driven, including academic reading, academic writing, and academic presentation as the basic form of classroom teaching. To integrate ideological and political elements, we have to make full use of such existing activity forms by embedding problem situations allowing value exploration into designing academic tasks: teachers may guide students discussing norms while presenting their research data and problems related to academic integrity during academic writing teaching, or asking students thinking about the social application boundaries of a certain technological breakthrough during academic presentation training. Such design makes the transmission of ideological and political elements become part and parcel of academic English learning activities.

In order to understand the working mechanism of teaching activity design, we need to consider two aspects: authenticity of task situation and depth of cognitive participation. The former refers to whether the problems in teaching activities are reasonable from the perspective of academic discourse (the value issues discussed should naturally be related to the academic context rather than artificially grafted on). The latter refers to the potential of activity design to promote higher-order thinking - students do not simply accept predetermined value conclusion but make their own value judgment by analyzing, comparing and evaluating academic materials. Academic debate, case discussion or position statement form have relatively good adaptability here. In addition, when designing classroom teaching activities, taking into consideration the relationship among different academic skill modules is needed such that ideological and political elements constantly appear and gradually deepen with various kinds of tasks like reading, writing, and presentation.

3. Evaluation Dimensions and Feedback Mechanisms for the Teaching Effectiveness of Ideological and Political Education in Academic English Courses for Science and Engineering

3.1 Multidimensional Evaluation Framework for Teaching Effectiveness

To measure the impact of integration strategies towards ideological and political elements by setting up a matching evaluation framework We traditionally evaluate academic language competence with the traditional evaluation system of academic English courses for science and engineering. Integrating an ideological and political dimension does not mean adding new indicators beyond language evaluation, rather, we need to integrate observation dimensions corresponding to integration objectives into our original framework. Language dimension aims at changing students' abilities in understanding and producing academic discourse: This is the basic evaluation orientation based on which other dimensions are built. Value dimension targets the depth of students' understanding and their ability to identify problems concerning scientific spirit, academic ethics, and awareness of science and technology humanities; What will be evaluated here isn't students' value position itself, but the degree of cognitive grasp. Cognitive dimension targets improving critical thinking and academic judgment—students' level of discernment regarding the quality of academic argumentation, the reasonableness of research design, and the normativity of data presentation[6].

There exist three dimensions with a nesting relationship: language dimension evaluation as the main line and observation points of the value and cognitive dimensions are embedded in the completion of academic tasks. This type of design relies on the fact that the impact of integrating ideological and political elements will ultimately reflect itself through the change of the quality of thinking and value sensitivity displayed by students when they process academic discourse – this can't be easily captured via specialized value scales, needs to be observed in real situation of academic language use. A multidimensional framework puts the effects of ideological and political teaching out of its unmeasurable and vague status, makes it describable and analyzable evaluation category providing a reference base for the operation of subsequent feedback mechanisms.

3.2 Implementation Pathways of Formative Assessment and Process-Oriented Feedback

Integration of ideology and politics has characteristics of processality and permeability requiring formative assessment and process-oriented feedback as an effect evaluation instead of just using summative assessment. Implementing formative assessment in academic English courses for science and engineering means inserting assessment nodes on every step of completing academic tasks (students identifying research ethics issues in academic reading, considering data presentation norms in academic writing, responding to social issues of science and technology in academic presentation) – these are observation windows which can be recorded and evaluated; by recording classroom discussion, reviewing academic writing draft with process orientation, student's reflective journal or other channels teachers can capture the trajectory of change in students' value cognition and academic attitudes. Essence of such assessment approach is changing judgment from a summative node after ending learning to constantly observing while learning.

Process-oriented feedback establishes formative assessment: Teachers give timely, targeted response when they observe students' value judgments and manifestations of their thinking quality – this becomes a teaching stage which encourages reflection as well. It can be guided questions (in writing), follow up questions/clarification during classroom discussion or in-depth exploration via individual exchange. The two basic characteristics of good process-oriented feedback is timeliness and development – timeliness means proximity of feedback with observation points while development refers to have the goal of guiding further thinking instead of judging right/wrong, uncovering assumptions implied by an argument, suggesting new angles not yet considered, encourage students to re-examine the basis for a certain judgment etc. Through using such feedback we turn assessment from one way evaluation towards a two-way dialogue, thus enhancing the teaching role of the assessment stage.

3.3 Mechanism for Applying Evaluation Results Oriented Toward Continuous Improvement

In the end, the goal of evaluation is for continuously optimizing teaching strategies rather than just making descriptive records on teaching effectiveness. It should be a good feedback loop that can dynamically calibrate integration strategies. Through observation of records and analysis of students' performance in multiple rounds of teaching, we can find out what kinds of ideological and political elements are integrated with better effect at certain teaching stages; which integration methods need adjustment; as well as which teaching materials have not yet fully released their value guidance functions. Accumulation of such pieces of information would allow teachers to make targeted improvement when they teach next time: adjust objectives setting of teaching modules, replace/supplement some materials, modify the organization forms of classroom activities etc.[7].

To make the feedback mechanism work well, there need to be systematic mechanisms for collecting and analyzing information. The records gathered from a single teaching activity is very accidental, but only after accumulation across semesters and classes do we find trends and patterns which have reference value. We need teachers to intentionally gather student's response to different materials and design of activities throughout multiple rounds of teaching, combining information collected via various observation channels and based on this finding identifying the links in integration strategies needing optimization. This core is the self-improvement mechanism at the course level: use the evaluation results as basic materials for course development, making the ideological and political integration of academic English courses for science and engineering go beyond initial exploration towards an optimally continuous cycle.

Conclusion

This study aims at identifying and integrating ideology and politics into academic English courses for science and engineering, establishing an integrated framework consisting of classification system, identification pathways, integration strategies, and evaluation and feedback. For identification, we identify four types of elements: scientific spirit, academic ethics, science and technology humanities, and intercultural communication, reveal their dual characteristics—text dependence and context sensitivity—and propose a multilevel identification strategy with a two-dimensional cross of content and stages. For integration, we show three pathways—the integration of teaching objectives, the thematic organization of content, and the contextualized embedding of methods—and stress the natural permeation of value elements based on the premise of not disturbing the knowledge logic of the course.

For evaluation, we build up a three-dimensional nested framework of language, value, and cognition and clarify the mechanism of formative assessment and process-oriented feedback, and the pathway of continuous improvement. Future work might focus on differences in the distribution of elements between different disciplinary directions and context-adaptive adjustment of integration strategies.

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