

Research on the Reconstruction of the Curriculum System of the Higher Vocational Rehabilitation Therapy Technology Major Based on the Rehabilitation Skills Competition

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Abstract: *The Rehabilitation Skills Competition serves as an important reference system for measuring the quality of talent cultivation in the higher vocational rehabilitation therapy technology major. The ability dimensions embedded in its assessment content have a direct mapping value for curriculum system design. This study starts from ability deconstruction and divides the competition assessment content into the basic level, the application level, and the integration level. It also identifies the structural gaps in the current curriculum system in terms of ability integration and the cultivation of cognitive and social skills. With the progressive hierarchy of abilities as the main thread, this study proposes a curriculum modular reorganization plan: the basic ability module is integrated with the professional basic courses, the specialized technology module corresponds to the core courses, and the comprehensive application module is mapped to the competition task items. Furthermore, a dynamic optimization mechanism is constructed, including a curriculum content iteration scheme based on the updating of competition standards, a coordinated adjustment strategy for ability attainment and course sequencing, and a multi-source feedback-driven self-improvement process for the curriculum system. This study provides an operable technical path and a feedback adjustment framework for the reconstruction of the curriculum system of the higher vocational rehabilitation therapy technology major.*

Keywords: *Rehabilitation Skills Competition; Higher Vocational Rehabilitation Therapy Technology; Curriculum System Reconstruction; Progressive Hierarchy of Abilities; Modular Reorganization; Dynamic Optimization Mechanism*

Introduction

The rationality of the curriculum system for the higher vocational rehabilitation therapy technology major is directly related to the degree of matching between talent cultivation and the requirements of professional positions. The Rehabilitation Skills Competition uses typical cases as carriers and comprehensively evaluates the multidimensional abilities of participants through standardized scoring rubrics. The assessment content and scoring weights of the competition reflect the latest industry requirements for the core competencies of rehabilitation therapy technicians. However, the current curriculum system generally adopts a linear progressive structure based on the logic of disciplinary knowledge, which leads to fragmented student knowledge and insufficient coverage in the training of cognitive abilities and social skills. The curriculum objectives remain at the level of mastering technical operations, the curriculum content lacks analysis of variable cases and interfering conditions, and the curriculum structure is arranged in parallel according to technical categories without integrated design. The above problems indicate that it is necessary and urgent to adapt the curriculum system by referring to the ability dimensions of the competition. This study aims to embed the ability logic reflected in the skills competition into the underlying parameters of curriculum design and to explore a curriculum reconstruction path that proceeds from ability deconstruction to modular reorganization and then to dynamic optimization.

1. Analysis of the Relationship Between the Ability Dimensions of the Rehabilitation Skills Competition and the Elements of the Curriculum System

1.1 Ability Deconstruction of the Assessment Content of the Rehabilitation Skills Competition

The assessment content of the Rehabilitation Skills Competition usually uses typical cases as carriers and covers multiple links such as reception and evaluation, plan formulation, technical operation, on-site emergency response, and humanistic communication. The ability deconstruction of the tasks in each link can extract three levels of ability elements. The basic level includes standardized operation abilities such as anatomical positioning, muscle strength assessment, and joint range of motion measurement. The application level involves the abilities of treatment path selection, parameter adjustment, and technique combination based on case classification. The integration level is reflected in the abilities of multi-task coordination, abnormal situation identification and management, and team collaboration. Different levels of ability present a nonlinear interactive relationship in the competition tasks, and the integration level ability often becomes a key indicator for distinguishing the performance level of the participants.

From the perspective of ability dimension attributes, the ability emphasized by the Rehabilitation Skills Competition is not a single technical proficiency but a complex that integrates cognitive skills (clinical reasoning and decision-making), motor skills (manual precision and rhythm control), and social skills (empathic expression and clarity of instruction). In the scoring standards of the competition items, clear weights are assigned to the logic of the operation process, the effectiveness of interaction with patients, and the timeliness of decision-making under emergency situations. This multidimensional ability structure requires the participants to complete a closed loop from information extraction to action execution within a limited time, which reflects the actual demand of professional positions for higher-order abilities.

1.2 Ability Gaps in the Curriculum System of the Higher Vocational Rehabilitation Therapy Technology Major

The current curriculum system of the higher vocational rehabilitation therapy technology major generally adopts a linear progressive structure of "basic medicine, professional foundation, core technology, and clinical internship." The curriculum organization tends to follow the logic of disciplinary knowledge, which leads students to form a fragmented knowledge structure. Compared with the ability requirements revealed by the Rehabilitation Skills Competition, this curriculum system has obvious gaps at the level of ability integration. The specific manifestations are as follows: there is a lack of cohesive design for ability progression among different courses. For example, between the courses "Therapeutic Exercise Techniques" and "Rehabilitation of Common Diseases," there is no intermediate-level case simulation training, making it difficult for students to automatically transform individual techniques into comprehensive management strategies for specific cases^[1].

Further analysis reveals that the existing curriculum system provides insufficient coverage of cognitive and social abilities. Abilities such as rapid information screening, treatment priority sequencing, and non-verbal communication regulation, which frequently appear in the competition assessment, are usually not set as separate objectives in the current curriculum or are only treated as implicit requirements. Furthermore, the curriculum evaluation method focuses on summative skill assessments and lacks recording and feedback mechanisms for the processes of on-the-spot decision-making and multi-task handling, which makes it difficult for students to obtain ability training similar to the competition environment during their course learning. This ability gap is essentially a structural deficiency of the curriculum system in cultivating composite abilities, rather than an insufficiency of individual course content.

1.3 Adaptability Analysis of Curriculum Elements under the Guidance of the Skills Competition

Curriculum elements include five basic dimensions: curriculum objectives, curriculum content, curriculum structure, curriculum resources, and curriculum evaluation. Using the ability dimensions of the Rehabilitation Skills Competition as a reference benchmark, an adaptability analysis of each element reveals the following. At the level of curriculum objectives, most courses still take "mastering a certain technical operation" as the end point, whereas the objective level required by the competition should be extended to "reasonably selecting and executing the technique under uncertain situations." At the level of curriculum content, existing textbook content focuses on standard procedure descriptions

and lacks analysis of common error patterns, boundary conditions, and variable cases, which does not match the interfering information and conditional limitations set in the competition.

The adaptability issues of curriculum structure and evaluation methods are even more prominent. The current curriculum structure is arranged in parallel according to technical categories, whereas the competition abilities present a spiral-shaped and integrated feature. Therefore, it is necessary to introduce a modular reorganization approach to integrate scattered technical training into case-oriented ability units. In terms of curriculum evaluation, the weight distribution between the quantified process indicators (such as judgment of the starting and ending points of manipulations and frequency of force adjustment) and the summative indicators (treatment effect and time utilization rate) in the competition scoring rubric can be transformed into a reference framework for course assessment. The adaptability analysis indicates that the adjustment of curriculum elements is not simply about adding more competition practice, but about embedding the ability logic contained in the competition into the underlying parameters of curriculum design^[2].

2. Design of Curriculum Modular Reorganization Based on the Progressive Hierarchy of Abilities

2.1 Integration Path of the Basic Ability Module and the Professional Basic Courses

The basic ability module corresponds to the prerequisite assessment content in the Rehabilitation Skills Competition, such as human body morphology recognition, basic movement analysis, and basic life support. Its core lies in establishing students' intuitive understanding of the correspondence between normal structures and dysfunctions. Integrating this module with professional basic courses such as Human Anatomy and Fundamentals of Kinesiology requires changing the conventional sequence of teaching chapter by chapter according to the disciplinary system and instead using functional units as the organizational thread. For example, the content of musculoskeletal anatomy can be presented simultaneously with the measurement techniques for the range of motion of the corresponding joints, so that structural knowledge and measurement operations are bound together within the same teaching unit, thereby shortening the conversion path from knowledge input to skill retrieval.

The specific implementation of the integration can adopt a "functional anchor reverse embedding" approach, which extracts decomposable micro-skill units (such as graded judgment of muscle tone and setting of the starting position for passive movements) from the basic ability assessment items of the competition, and sets these skill units as the terminal tasks for each chapter of the professional basic courses. Each chapter organizes deconstructive content around one or more skill units, including the identification of related structures, the surface manifestations of dysfunctions, and the safety boundaries of basic manual operations. This integration path ensures that the basic courses no longer remain at the level of descriptive knowledge, but instead directly provide a cognitive framework with operational orientation for subsequent specialized technical training^[3].

2.2 Correspondence Between the Specialized Technology Module and the Core Courses

The specialized technology module covers the core operation items in the fields of physical therapy, occupational therapy, and physical factor therapy in the Rehabilitation Skills Competition. Each item requires the participant to complete a continuous sequence of actions under standard postural guidance and to adjust technical parameters based on real-time feedback. This module forms a one-to-one mapping relationship with core courses such as Therapeutic Exercise Techniques, Occupational Therapy Techniques, and Physical Factor Therapy Techniques. However, this correspondence should not remain at the level of course titles but should be refined down to the smallest trainable units of technical classification. For example, the balance training, coordination training, and muscle strength enhancement training in the course Therapeutic Exercise Techniques correspond respectively to the specialized management requirements under different injury models in the competition.

The key to establishing the correspondence between the specialized technology module and the core courses lies in clarifying the hierarchical positioning of technical abilities that each core course undertakes. Some techniques belong to closed skills (such as the standard operating procedure of isokinetic muscle strength testing), which are suitable for high-repetition training in the early stage of the curriculum. Other techniques belong to open skills (such as adjusting training resistance according to the patient's fatigue level), which require the introduction of variable conditions in the middle and late stages of the curriculum. By clearly marking the skill type of each technique and its frequency and

weight of appearance in the competition items in the course syllabus, this approach can provide quantifiable adjustment evidence for the teaching sequence and class hour allocation of the core courses, thereby avoiding homogenization or fragmentation of technical training among different courses.

2.3 Mapping Mechanism Between the Comprehensive Application Module and the Competition Task Items

The comprehensive application module aims to integrate the basic abilities and specialized techniques, enabling learners to complete the entire process from assessment and decision-making to implementation and adjustment in simulated case scenarios. The competition task items of the Rehabilitation Skills Competition are usually designed with time as the constraint axis and incorporate multi-system injury cases and concurrent conditions, which impose comprehensive requirements on the participants' task decomposition ability, process management ability, and error correction ability. To map the comprehensive application module to the competition task items, it is necessary to decompose each set of competition tasks into a cluster of trainable subtasks, including information collection subtasks, path decision-making subtasks, technique execution subtasks, and effect verification subtasks, while clarifying the dependencies and error tolerance boundaries among these subtasks^[4].

The carrier for the operation of this mapping mechanism is a graded case library, in which each case corresponds to a miniature version of a competition task item. The cases are divided into three levels according to task complexity: single-system acute-phase cases, multi-system recovery-phase cases, and complex cases accompanied by situational interference. Each case is transformed into a set of clear modular training objectives. For example, a certain case requires the completion of four technique transitions and two decision-point judgments. By setting up a case-task correspondence table, the comprehensive abilities reflected in the competition task items can be gradually reduced to the training sessions of the modules, so that learners have already acquired the decomposition abilities to handle various task components through modular training before entering the complete competition practice.

3. Construction of Dynamic Optimization and Evaluation Feedback Mechanism for the Curriculum System

3.1 Curriculum Content Iteration Scheme Based on the Updating of Competition Item Standards

The competition item standards of the Rehabilitation Skills Competition are adjusted at regular intervals. The adjustment directions are mainly reflected in three aspects: the replacement of case types, the refinement of scoring rubrics, and the enhancement of the standardization level of operational procedures. To transform the changes in competition item standards into the basis for curriculum content iteration, it is necessary to establish an operational framework for difference comparison and content mapping. The specific operations include extracting the technical items added in the new standards, the technical items deleted, and the assessment points with changed weights, and then classifying and archiving them into the knowledge units or skill units of the corresponding courses. For example, if a deduction item for "timeliness of treatment record writing" is added to the competition scoring table, it is necessary to add a synchronous writing training session in the course Rehabilitation Assessment or related courses, and to adjust the time parameters of the original writing training. At the same time, for technical items with significantly increased weights (such as the proportion of fall risk assessment in the scoring rising from 5% to 12%), the training frequency and simulation test scenarios should be increased in the corresponding courses, and the assessment weight coefficient of that item should be adjusted to maintain dimensional consistency with the competition item standards^[5].

The iteration of curriculum content should not adopt a physical superposition approach, but rather requires equivalent replacement or structural reorganization of the existing content. When the operational steps of a certain technique in the competition item standards change (such as the gripping method and rhythm requirements for passive range of motion), the corresponding old version of the operation demonstration in the original curriculum should be replaced with the new version, and the supporting practical training manuals and assessment checklists should be revised accordingly. For technical items whose weights have decreased or have been removed due to adjustments in the competition item standards, it is necessary to evaluate whether they still have value for basic ability training; if not, they should be deleted to control the capacity and density of the curriculum content. Furthermore, a version control table can be established to record the numbers of replaced, added, and

deleted technical items in each iteration cycle, as well as the curriculum units to which they belong, thus forming a traceable content change log. This incremental iteration scheme, triggered by the competition item standards, can ensure that the curriculum content remains synchronized with the industry's cutting-edge operational norms in terms of update frequency, while avoiding curriculum content bloat caused by disorderly accumulation.

3.2 Linkage Adjustment Strategy Between Ability Attainment and Course Sequencing

Ability attainment refers to the actual level of mastery of preset ability goals achieved by a learner after completing a certain course or module. This attainment can be quantitatively collected through methods such as phased skill assessments, simulated competition item tests, or recordings of operational processes. Course sequencing specifies the order and spacing of various courses and their internal units. The core of the linkage adjustment strategy lies in establishing a reverse constraint of ability attainment data on course sequencing: when the ability attainment of a certain prerequisite module is detected to be below a set threshold, the subsequent course units that depend on the abilities of that module should automatically trigger a delay or insert remedial training sessions, rather than mechanically proceeding according to the original sequencing.

The operation of this strategy requires the presetting of an ability dependency map, which clarifies the prerequisite ability units for each course unit and their minimum attainment requirements. For example, the spinal cord injury unit in the course Rehabilitation of Common Diseases depends on the two sub-abilities of positioning transfer and wheelchair operation in the course Therapeutic Exercise Techniques. If the class average attainment of the latter falls below the passing line, the teaching sequencing should be adjusted to prioritize the arrangement of ability remediation stations (concentrated training targeting the weak sub-abilities), and the original course progress should be resumed only after the attainment has recovered. When the ability attainment is higher than expected, subsequent related content can be moved forward, creating a positive compression effect. Furthermore, an attainment heatmap analysis tool can be introduced to visually present the distribution differences in mastery levels across different classes and different ability units, assisting teachers in quickly identifying key nodes for sequencing adjustment. This sequencing adjustment based on attainment data transforms the curriculum system from operating on a fixed schedule to a responsive scheduling mode, thereby improving the matching accuracy between the allocation of teaching resources and the current state of ability attainment^[6].

3.3 Self-Improvement Process of the Curriculum System Driven by Multi-Source Feedback

Multi-source feedback covers different types of information from sources such as competition item score analysis, interviews with participating contestants, review records of competition-leading teachers, and cross-grade ability tracking assessments. Incorporating various types of feedback into the improvement process of the curriculum system requires the construction of a closed-loop self-improvement model. This model consists of four stages. In the feedback collection stage, the lost points in the competition items, the operational bottlenecks of the contestants, and the judges' comments are coded and processed, and keywords and ability tags are extracted. In the attribution analysis stage, the feedback is mapped to specific courses, modules, or teaching units, and the source level of the ability deficiency (goal setting problem, content deficiency problem, or sequencing arrangement problem) is identified. In the solution generation stage, curriculum adjustment plans are formulated based on the attribution results, such as adding or deleting content units, adjusting class hour allocation, or reorganizing module sequences. In the effect verification stage, the changes in ability attainment before and after the adjustment are compared in the next round of teaching.

The closed-loop characteristic of the self-improvement process is reflected in the systematic revision triggered after each competition cycle. A revision log should be written to record the feedback source, attribution logic, and expected improvement goals corresponding to each curriculum change. After multiple iterations, the revision log itself becomes a structured archive of the curriculum system's optimization history, which can identify recurring problem types (such as certain technical items persistently becoming hot spots for point loss across different competition cycles), thereby leading to more precise adjustments of the relevant curriculum elements. Furthermore, convergence evaluation indicators for the feedback loop can be established, such as the improvement margin of the same problem after two consecutive iterations; if the improvement margin falls below a set threshold, it suggests potential bias in the attribution analysis, necessitating the introduction of a third-party review mechanism. The multi-source feedback-driven process avoids the limitation of making fragmented

modifications based only on fragments of competition results, endows the curriculum system with an internal mechanism for continuous evolution, and forms an accumulable and traceable optimization knowledge base.

Conclusion

This study, based on the ability dimensions of the Rehabilitation Skills Competition, completes the design of a complete reconstruction framework for the curriculum system of the higher vocational rehabilitation therapy technology major, from gap identification to modular reorganization and then to dynamic optimization mechanisms. Through ability deconstruction, this study clarifies the ability elements of the basic level, the application level, and the integration level, as well as their nonlinear interactive relationships, and reveals the structural deficiencies of the current curriculum in ability articulation and composite ability cultivation. On this basis, the constructed basic ability module, specialized technology module, and comprehensive application module form mapping relationships with the professional basic courses, core courses, and competition task items respectively, achieving a transformation of the curriculum organization from knowledge logic to ability logic. Furthermore, the established dynamic mechanisms based on competition item standard iteration, linkage adjustment of ability attainment and course sequencing, and multi-source feedback-driven self-improvement provide the curriculum system with an internal driving force for continuous evolution.

Future research directions may include: exploring the mechanisms for the interchangeability of curriculum modules and the mutual recognition of credits among different levels of higher vocational institutions, developing digital curriculum management tools that support dynamic tracking of ability attainment, and investigating the optimal matching model between the update cycle of competition standards and the iteration frequency of curriculum content.

Practical verification: The above curriculum system reconstruction scheme was preliminarily implemented in the rehabilitation therapy technology major of our institution. Through teaching practice and targeted pre-competition intensive training, the final representative team performed stably and excellently in the provincial competition, winning one third-prize group award and three third-prize individual awards in the Hubei Provincial Rehabilitation Skills Competition. These practical achievements confirm the effectiveness of the curriculum system reconstruction, truly realizing the virtuous cycle of promoting teaching, learning, and reform through competition and achieving significant educational outcomes.

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Research on the Reconstruction of the Curriculum System of the Higher Vocational Rehabilitation Therapy Technology Major Based on the Rehabilitation Skills Competition

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