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 is an excellent way to showcase the quality of talent education in the higher vocational rehabilitation therapy technology major. The dimensions of the ability in the assessment content directly correspond to the design of the curriculum system. Based on ability deconstruction, the three levels of competition assessment content in this paper are the basic level, the application level and the integration level. It also indicates that there are structural problems in the current curriculum system regarding the integration of abilities and the cultivation of cognitive and social skills. With the gradual ascent of ability as the main thread, this paper proposes a curriculum modular reorganisation plan: the basic ability module will be combined with the professional basic courses, the specialised technology module will correspond to the core courses, and the comprehensive application module will be mapped to the competition task items. At the same time, there will be a dynamic optimisation mechanism to update the competition standards, adjust the strategy for achieving ability and the order of courses, and continuously improve the curriculum system based on all kinds of feedback. The good technical route and feedback-adjustment mode for the reconstruction of the curriculum system in the major of higher vocational rehabilitation therapy technology are put forward here.*

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

Introduction

The reason for the curriculum system of the higher vocational rehabilitation therapy technology major is directly related to how well talent cultivation meets the needs of professional positions. Select the best cases of rehabilitation skills and set up a general scoring rule to evaluate the all-round performance in all areas through competitions. The content and weight of the scores in the competition indicate the current needs of the industry for core competencies of rehabilitation therapy technicians. However, the current curriculum system is generally in a linear-progressive structure based on the logic of disciplinary knowledge, so students' knowledge is fragmented and there is insufficient training in cognitive abilities and social skills. The curriculum goals are still at the level of mastering technical operations, the curriculum content does not include analysis of variable cases and interfering conditions, and the curriculum structure is arranged in parallel according to technical categories without integration. The above problems show that it is necessary and urgent to revise the curriculum system in light of the ability dimensions of the competition. The goal of this paper is to incorporate the ability logic demonstrated in the skills competition into the fundamental parameters of curriculum construction and to explore a path for curriculum reconstruction based on the deconstruction of abilities, modular organisation and dynamic optimisation.

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

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

The general direction of the assessment in the Rehabilitation Skills Competition is to cover typical cases and all links of the process, such as reception and evaluation, plan formulation, technical operation, on-site emergency response and humanistic communication. Deconstruction of the ability of each link's task can obtain three levels of ability elements. The first level generally includes daily living skills, such as basic orientation, muscle strength, range of motion at joints, etc. At the application level, determine the direction of treatment, set parameters and combine various methods according to the classification of cases. The degree of integration can be seen in the capacity for multi-task coordination, handling abnormal situations, teamwork, etc. At all levels of ability, there are various non-linear interactions in the competition tasks, and a person's overall level of ability often serves as an important factor in differentiating the performance levels of the participants.

In terms of attributes of the ability dimension, the ability promoted by the Rehabilitation Skills Competition is not a single technical skill but rather a combination of cognitive skills (clinical reasoning and decision-making), motor skills (manual precision and rhythm control), and social skills (empathic expression and clarity of instruction). Some weight has been given to the logic of the operation process, the effectiveness of interaction with patients and the timeliness of decision-making in emergency situations in the scoring standards for the competition items. Given that there are many attributes of ability, participants need to complete a closed-loop process of information extraction and action execution in a short amount of time; thus, high-level abilities in professional positions are required.

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

The structure of the current curriculum system for the major of higher vocational rehabilitation therapy technology is linear, and generally includes the four parts of basic medicine, professional foundation, core technology and clinical internship. The organisation of this curriculum is based on disciplinary knowledge, and thus the knowledge of students is fragmented. The requirements for the Rehabilitation Skills Competition are much higher than those in this curriculum system, and the level of ability integration is relatively low. The specific forms are as follows: There is a lack of coordinated Design for ability progression among the various courses. For example, there has been no intermediate-level case simulation training carried out between the "Therapeutic Exercise Techniques" course and the "Rehabilitation of Common Diseases" course, so it will be difficult for students to spontaneously integrate all these techniques in a comprehensive management plan for a particular case[1].

Based on the above analysis, the current curriculum system does not cover cognitive and social development sufficiently. Abilities such as rapid collection of information, organisation of problem ordering and control of non-verbal language are frequently required in competition assessment, but they are generally not listed as specific objectives in the current curriculum and are only mentioned indirectly. In addition, the way to evaluate the curriculum is only to assess final achievement; it does not record or offer feedback on the process of immediate decision-making and multitasking, so students cannot gain experience in a competitive environment during their studies. The issue lies in the structure of the curriculum system for cultivating composite abilities; not all the individual courses are deficient in content.

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

The five kinds of curriculum elements are: curriculum goals, curriculum content, curriculum organisation, learning materials, etc. Based on the ability dimensions of the Rehabilitation Skills Competition, adaptation analysis has been carried out for all sections. At the level of curriculum objectives, most courses still hope that students can master a particular technical operation as their final goal, but the required level in the competition should be raised to "reasonably select and carry out the technique under uncertain situations". At the level of curriculum content, the current textbook content only covers standard procedures and does not analyse common error patterns, boundary conditions or variable cases; therefore, it does not cover the interfering information and conditional limitations

mentioned in the competition.

Adaptability problems in the structure of the curriculum and assessment are also very pronounced. The current structure of the curriculum is divided into technical categories, but the competition abilities have a spiral and integrated shape. Therefore, in order to organise the distributed technical training, a modular system of case-oriented ability units will be introduced. In terms of curriculum evaluation, the distribution weights of the quantified process indicators (such as the judgment of the starting and ending points of manipulations and the frequency of force adjustment) and the summative indicators (treatment effect and time utilization rate) in the competition scoring rubric can be used as a reference framework for course assessment. Based on the adaptability analysis, the modification of curriculum contents should not be the addition of more competition practice but rather the incorporation of competition ability logic into the basic elements of curriculum construction[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 first module of the general-ability area is to present the pre-test items for the Rehabilitation Skills Competition; these include recognising the shape of the human body, basic motion analysis and fundamental life support. First, it should make students feel that normal structures are healthy and abnormal ones are not. To integrate this module with the professional basic courses, such as Human Anatomy and Fundamentals of Kinesiology, the traditional chapter-by-chapter teaching order needs to be revised in line with the disciplinary system, and functional units should be taken as the organisational structure. For example, one can present the contents of musculoskeletal anatomy and the measurement methods for the range of motion of the corresponding joints together so that structural knowledge and measurement operations are linked in the same teaching unit, thus shortening the conversion path from knowledge input to skill retrieval.

The actual construction of the integration can be done in the form of "functional anchor reverse embedding"; that is to say, decomposable micro-skill units (such as graded judgment of muscle tone and setting of the starting position for passive movements) are extracted from the basic ability assessment items of the competition and then set as the terminal tasks for each chapter of the professional basic courses. The contents of deconstruction in each chapter will be based on one or more skill units, and it will cover the identification of related structures, the surface manifestations of dysfunction, and the safety boundaries of basic manual operation. The first two can make the foundation course more interesting; they will no longer be abstract but will directly present a cognitive system that can be applied to the special technical training to follow[3].

2.2 Correspondence Between the Specialised Technology Module and the Core Courses

The first functions of the specific technology modules are the areas of physical therapy, occupational therapy and physical factor therapy in the Rehabilitation Skills Competition. All the items need to be done in order; keep your body still and adjust the technical parameters according to the real-time feedback. This module directly corresponds to the main courses of Therapeutic Exercise Techniques, Occupational Therapy Techniques and Physical Factor Therapy Techniques. However, this correspondence should not be limited to the level of course titles; it needs to be further broken down into the smallest trainable units of technical classification. For instance, the balance training, coordination training and muscle-strength training in the course "Therapeutic Exercise Techniques" are in line with the particular management needs of different types of injuries in competition.

To set up the correspondence between the special technology module and the main courses, we need to determine what level of technical ability each main course aims to achieve. Some are regarded as closed skills (such as the standard operating procedure for isokinetic muscle strength testing), and they are suitable for high-repetition training in the early stages of the curriculum. Other ways are open skills (such as changing training resistance according to one's level of fatigue), and they need to be added in the middle and later parts of the curriculum. By specifying the type of skill for each technique, as well as how often and to what extent they appear in the competition items of the course syllabus, one can obtain quantitative adjustment data for the teaching sequence and class hour allocation of core courses to avoid homogeneity or fragmentation in technical training among the various courses.

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

All modules in the application will have basic functions and special skills, and learners can complete all the steps of assessment and decision-making in simulated case scenarios, then be adjusted accordingly. Generally speaking, the competition tasks in the Rehabilitation Skills Competition are set to be time-limited and cover multiple systems of injury as well as various concurrent conditions; thus, participants need to have good skills in task decomposition, process management and error correction. To map all modules of the application to the competition tasks, each set of competition tasks needs to be divided into a cluster of trainable subtasks, such as information collection subtasks, path decision-making subtasks, technique execution subtasks and effect verification subtasks, and the dependencies and error-tolerance boundaries among these subtasks should be clarified[4].

The carrier of the operation for this mapping mechanism is a graded case library, and each case is a mini-version of a competition task item. According to the difficulty of the tasks, the three divisions of the cases are single-system acute-phase cases, multi-system recovery-phase cases and complex cases with situational interference. All of them are in a modular form for training now. For example, a particular case needs to employ the four techniques and make two judgment points. Build a case-task correspondence table to gradually break down the general abilities in the competition task items into training sessions for each module, and by the time of full competition practice, learners will have acquired the decomposition ability to handle all parts of various tasks through modular training.

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

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

The standard of the competition items in the Rehabilitation Skills Competition will be changed periodically. The three directions for improvement are to change the types of cases, to enhance the scoring rubrics, and to raise the standard of normalisation for operating procedures. To make full use of the change in the standard for the competition item as a basis for revising curriculum content, we need to build an effective framework of difference comparison and content mapping. The actual operations are to extract the technical items added in the new standards, the deleted technical items, and the assessment points with changed weights, and then classify and archive them in the knowledge units or skill units of the corresponding courses. For example, if the deduction item for "timeliness of treatment record writing" is added to the competition scoring table, it will be necessary to hold a synchronous writing training session in the course "Rehabilitation Assessment" or related courses and adjust the time parameters of the original writing training. At the same time, for technical items that have increased significantly in weight (e.g., the proportion of fall risk assessment in the scoring has risen 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 needs to be adjusted to be in line with that of competition items[5].

Iteration of curriculum content should not be in the form of physical addition, but rather in the form of replacement or restructuring of the existing content. When changing the operational steps of a particular technique in the competition item standards (e.g., modifying the grip method and rhythm requirements for the passive range of motion), the old version of the operation demonstration in the original curriculum must be replaced by the new one, and the supporting practical training manuals and assessment checklists need to be revised accordingly. For technical items that have decreased in weight or have been removed due to changes in the standards for competition items, it needs to be determined whether they are still useful for training in basic abilities; otherwise, they should be deleted to control the quantity and density of the curriculum content. A version control table can be used to record how many technical items have been replaced, added or deleted in each round, to which curriculum units they belong, etc., in order to create an auditable history of content modification. Based on the competition standards for items, gradually add new content to the curriculum in light of changes in the industry at the latest possible time, avoid adding too much content randomly, and keep up with the new standards of the industry.

3.2 Linkage Adjustment Strategy Between Ability Attainment and Course Sequencing

Attainment of ability refers to how close a learner has come to achieving the set goals for abilities after completing a particular course or unit. The results will be in the form of data from staged skills tests, mock competition item tests and recordings of the operation process. Course sequencing shows the order and time interval of the different courses and their contents. The foundation of the linkage adjustment strategy is the construction of a reverse constraint for ability attainment data in course sequencing; that is to say, if it is determined that the ability attainment of a particular prerequisite module falls below the preset threshold, then the following course units that are dependent on the abilities of this module should be automatically delayed or remedial training sessions added, and not proceed according to the original schedule.

According to the plan above, an ability dependency map will be constructed to list the prerequisite ability units of each course unit and the minimum achievement requirements. For example, the unit on spinal cord injury in "Rehabilitation of Common Diseases" is based on the two sub-abilities of positioning transfer and wheelchair operation in the course "Therapeutic Exercise Techniques". If the class's average score in the latter half is below the passing threshold, then the teaching plan needs to be revised to increase the proportion of setting up ability remediation stations (concentrated training for weak sub-abilities), and the original course progress should only be resumed after the scores have recovered. If the actual results exceed expectations, then the following related materials can be released promptly and will have a good spread. An achievement heatmap analysis tool can be added to show the distribution of mastery at different times and in various areas of ability, and thus help teachers quickly identify the main problems that need to be addressed. Based on the achievement data of the students, the order of learning can be adjusted to create a flexible class schedule that is more in line with the current level of the students' abilities[6].

3.3 The Self-Improvement Process of the Curriculum System Based on Multi-source Feedback

Multiple-Source Feedback is all the kinds of information that can be obtained from many places, such as analysing the scores of competition items, interviewing contestants, reviewing records of competition-leading teachers, tracking cross-grade ability assessment results, and so on. In order to integrate all kinds of feedback in the improvement of the curriculum system, a closed-loop self-correction and learning model needs to be established. There are the following four links. Lost points in the competition items, operational bottlenecks of the contestants, and judges' comments are coded and processed in the feedback collection stage, and keywords and ability tags are extracted. At the time of adding feedback, it is possible to specify the particular courses, modules or teaching units to which it belongs, and also to determine the source level of the ability deficiency (e.g., goal-setting problem, content deficiency problem, sequencing arrangement problem). At the solution generation stage, according to the results of attribution, curriculum adjustment plans are made to add or remove content units, change class hour allocation, rearrange module sequences, and so on. The change in ability attainment before and after the adjustment will be compared in the next round of teaching during the effect verification stage.

A closed-loop feature of the self-correction process is that it will be periodically corrected after each round of competition. A revision log should be set up to record the source of the feedback, attribution logic and desired improvement goals for all changes in the curriculum. After many revisions, the revision log has been organised to record the optimisation process of the curriculum system; therefore, repeated types of problems (e.g., some technical items are consistently "hot spots" for point loss in all competition rounds) can be identified, and more targeted adjustments can be made to the relevant parts of the curriculum. Convergence evaluation indicators for the feedback loop can also be set; for example, one can determine whether the improvement margin of the same problem is small after two consecutive rounds, and if it is too small, it may indicate bias in the attribution analysis, so an external audit needs to be added. The multi-source feedback-driven process will not be subject to the problem of fragmented modification based only on parts of the competition results; instead, it will have an internal mechanism for continuous development of the curriculum system and build an accumulable and traceable optimisation knowledge base.

Conclusion

According to the ability dimensions of the Rehabilitation Skills Competition, this paper will

construct a full-process reconstruction framework for the curriculum system of the higher vocational rehabilitation therapy technology major, correct shortcomings, organise them into modules, and dynamically optimise them. Deconstruction of ability is employed in this paper to identify the components of ability at the basic level, the application level and the integration level, as well as their nonlinear interaction, and to reveal structural deficiencies in the articulation of ability and cultivation of composite ability in the current curriculum. Based on the above, the constructed basic ability module, specialised technology module and comprehensive application module have been mapped to the professional basic courses, core courses and competition task items, respectively, and the curriculum organisation has been changed from knowledge logic to ability logic. There are also some good dynamic mechanisms for the iteration of competition item standards, linkage adjustment of ability attainment and course sequencing, and multi-source feedback-driven self-improvement that provide internal motivation for the continuous development of the curriculum system.

In the future, we will also investigate the reasons for the interchangeability of curriculum modules and mutual recognition of credits among different levels of higher vocational education institutions, the development of digital curriculum management tools for dynamic tracking of ability attainment, an optimal matching model to update the cycle of competition standards and the frequency of curriculum content iteration.

Practical Verification: The curriculum system reconstruction plan mentioned above has been tentatively introduced in the rehabilitation therapy technology major at our school. Based on teaching experience and extensive pre-competition training, the final representative team has achieved good results in the provincial competition and won a one-third prize group award and three third-prize individual awards at the Hubei Provincial Rehabilitation Skills Competition. The practical results mentioned above indicate that the reconstruction of the curriculum system has been successful, and we have achieved the goal of promoting teaching and learning through competition and obtaining excellent educational results.

Fund Projects

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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