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Construction of Career-Oriented Personalized Physical Training Programs in Higher Vocational Colleges Empowered by AI Visual Motion Capture

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Abstract: In recent years, artificial intelligence visual technology has achieved rapid development. With the technical advantages of non-contact collection, high-precision identification, and real-time data analysis, AI visual motion capture creates new possibilities for the innovation of physical education in higher vocational colleges and lays a foundation for constructing career-oriented personalized training programs. Teachers can build career-oriented personalized physical training programs relying on this technology, completely breaking the limitations of traditional training and realizing the transformation of physical training from "unified and extensive mode" to "targeted and personalized mode," and from general physical fitness training to career-specific physical training. It helps physical education in higher vocational colleges truly serve students' professional competence development. In view of this, this paper first elaborates the significance of constructing personalized physical training programs in higher vocational colleges empowered by AI visual motion capture under career orientation, and then puts forward a series of feasible construction strategies, so as to provide certain references for relevant researchers.

Keywords: Career orientation; AI visual motion capture; Physical education in higher vocational colleges; Personalized training program

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1. Significance of constructing personalized physical training programs in higher vocational colleges empowered by AI visual motion capture under career orientation

1.1. Breaking the limitations of manual training and realizing precise movement guidance

In traditional physical training of higher vocational colleges, teachers identify students' movement problems only through naked-eye observation and empirical judgment, which brings defects such as blind observation

areas, ambiguous judgment, and delayed error correction. Many students' problems, including body posture deviation and inaccurate force exertion, cannot be corrected for a long time. This not only leads to poor training effects, but also forms wrong movement habits easily, triggering hidden sports risks such as lumbar muscle strain and uneven joint stress, and even hinders students' compliance with professional operation standards in subsequent jobs in serious cases. Featuring all-round and high-precision dynamic identification without blind spots, AI visual motion capture can capture students' limb angles, movement tracks, and gravity center changes in real time, accurately locate irregular movements, asymmetric postures, and wrong force exertion, and provide students with accurate, instant, and visualized training error correction guidance. It thoroughly overcomes the low precision of manual guidance and realizes precise movement guidance [1].

1.2. Adapting to individual differences and building a personalized training system

Higher vocational students have obvious individual differences in physical quality, sports foundation, body posture, and physical fitness weaknesses. The unified training model cannot achieve individualized teaching. For instance, students with weak foundations fail to keep up with training rhythms and easily develop negative emotions such as fear and weariness of training; students with solid foundations stay in low-intensity training for a long time without physical improvement. AI visual motion capture can dynamically obtain each student's sports characteristics and training status, and accurately identify deficiencies in physical fitness and irregular movements [2]. The AI visual motion capture system independently adjusts training intensity, items, and difficulty according to individual differences among students, so as to build an individualized physical training system that teaches students in accordance with their aptitude. It ensures that every student can steadily improve physical functions, adjust body postures, and correct sports movements within a suitable range [3].

1.3. Standardizing the formation of professional postures and reducing the risk of occupational strain in the future

Most jobs for higher vocational students involve long-term repetitive operations and fixed postures, which easily trigger occupational posture problems and sports injuries such as hunchback, scoliosis, uneven shoulders and pelvic tilt. Apart from improving students' physical fitness, physical education in higher vocational colleges shall correct students' bad postures in advance and cultivate scientific sports and working postures, so as to avoid occupational strain at the source [4]. AI visual motion capture can monitor students' static postures and dynamic movements in real time, continuously rectify bad postures and cultivate correct sitting, standing, and running postures, so as to improve students' physical adaptability for jobs and long-term career development capacity [5].

2. Construction strategies of personalized physical training programs in higher vocational colleges empowered by AI visual motion capture under career orientation

2.1. Aligning with job requirements and reconstructing a professional specialized training content system

To fundamentally solve the problems of generalized traditional physical training content, disconnection from professional posts, and insufficient targeted education, teachers shall make full use of the precise

identification advantages of AI visual motion capture. In accordance with the occupational physical characteristics and operation posture standards of various majors, teachers shall reconstruct a professional and personalized training content system meeting higher vocational talent training requirements and abandon generalized and stereotyped traditional training contents [6].

For engineering majors such as intelligent manufacturing and mechanical and numerical control technology, their posts mostly require delicate operations, static stability, and precise upper limb force. Long-term fixed postures easily cause limb stiffness and joint strain. Therefore, teachers shall set up special training items including upper limb strength control, limb stability maintenance, and precise movement reproduction. Real-time capture of students' limb swing range, uniformity of hand force and joint stability via AI is adopted to carry out refined corrective training, ensuring students meet the delicate operation requirements of posts.

For majors including logistics management and architectural engineering, most jobs involve load-bearing work, long-distance walking, and high-intensity physical output. Special training focusing on core endurance, load balance, and lower limb strength shall be established. Teachers rely on AI to dynamically monitor problems such as gravity center deviation and posture deformation under load conditions, and timely correct strain-inducing movements to cultivate scientific physical fitness and operation postures for jobs [7].

For service majors such as preschool education, tourism service, business etiquette and nursing, posts impose high requirements on personal temperament, body appearance and limb coordination. Teachers mainly carry out standardized training of standing, sitting and walking postures as well as limb stretching and coordination training. AI visual recognition technology is adopted to timely correct bad postures such as chest collapse and hunchback, so as to cultivate decent and elegant professional images.

Taking physical education majors as an example, their professional competence requires physical explosive power, limb flexibility, and movement rhythm. Teachers can design special training modules covering sudden stop explosive power, dynamic stretching, and movement rhythm control. Relying on AI visual capture technology to decompose and analyze the force nodes and movement range of single movements, teachers can accurately locate subtle defects in students' irregular movements and lay a foundation for subsequent targeted corrective training.

Through the reconstruction of professional contents by classification and stratification, physical training can be highly consistent with post competence standards, making physical training serve students' career growth and post adaptation [8].

2.2. Relying on intelligent data and building a hierarchical personalized training model

Higher vocational students have distinct gaps in admission foundations, physical quality, sports habits, and postures. The unified training model fails to meet all students' learning conditions and easily leads to the dilemma that top students cannot get sufficient training while underachievers cannot keep up. Teachers shall conduct hierarchical and classified training based on students' personal sports data and learning files according to their physical deficiencies, postures, and professional physical training demands. Students are divided into basic group, improvement group, and intensive group to fundamentally break the drawbacks of the one-size-fits-all training mode [9].

First, students in the basic group generally suffer from poor physical fitness, uncoordinated postures, irregular movements, and lack of sports interest. Physical training mainly focuses on cultivating basic physical fitness, correcting bad postures, and standardizing fundamental movements with low difficulty, slow speed, and small load. It helps students abandon long-term wrong sports habits, gradually form scientific

exercise patterns, consolidate physical foundations, and eliminate fear of training.

Second, students in the improvement group have standard physical fitness and basically regular postures but lack professional specialized physical fitness and refined movements. Training centers on balanced optimization of physical fitness, polishing professional movements and strengthening post-adaptive endurance to gradually improve physical coordination and movement stability and make up for deficiencies in occupational physical fitness [10].

Finally, students in the intensive group boast good physical quality, standard movements and sufficient physical reserves. Physical training focuses on adaptation to high-intensity post work, breaking limits of ultimate physical fitness and improving precise movement control to meet physical demands of complex post operations and realize high-quality employment and long-term career development.

In addition, the AI visual motion capture system feeds back students' training conditions in real time and automatically adjusts training frequency, intensity, speed, and difficulty according to different levels to realize dynamic adaptation and precise training, enabling students at all levels to gradually improve their physical performance [11].

2.3. Implementing real-time intelligent error correction and strengthening precise training of movements and postures

Traditional physical training relies on teachers' manual observation, which is limited by observation perspectives and prone to omission of details and delayed error correction with subjective judgment deviations. Subtle movement deviations and asymmetric postures cannot be discovered in a timely manner, and students will gradually form wrong movement habits over time, resulting in poor training effects and various sports and occupational strain injuries. Teachers carry out full-process intelligent corrective training via AI visual motion capture technology to realize non-contact, full-coverage, and high-precision all-day dynamic monitoring and instant guidance, effectively making up for the deficiencies of traditional manual teaching [12].

In basic fitness training, posture correction training, and professional special movement training, the AI visual motion capture system collects sports data including bone and joint angles, limb movement tracks, gravity center displacement, and muscle force timing in real time, and fully compares them with standard professional movement paradigms and scientific exercise norms. Once irregular movements, incorrect force exertion, unbalanced postures, or strain-prone poses are detected, the AI system sends immediate reminders via voice, visualized interface marks, and comparative movement demonstrations to prompt students to adjust postures and force methods in a timely manner.

Different from delayed after-class correction, intelligent error correction runs through the whole training process and corrects every tiny deviation instantly. Students will gradually abandon wrong exercise modes and develop standardized postures and scientific force habits meeting professional post requirements through repeated practice. It fundamentally improves the accuracy of physical training and avoids sports injuries and future occupational strain, realizing dual improvement of posture quality and movement literacy [13].

2.4. Constructing dynamic process control and realizing closed-loop training optimization

Normalized and dynamic process supervision serves as one of the optimal approaches to promote continuous improvement of personalized training and break training bottlenecks, and it is an effective measure to overcome extensive and lagging drawbacks of traditional training. Relying on the technical advantages of

full-process recording and data review of AI visual motion capture, teachers build a full-process closed-loop control system of "real-time training execution–dynamic data monitoring–accurate problem judgment–timely program update–continuous achievement improvement." It ensures every training link leaves records and every defect gets solutions, making progress in each training session [14].

In regular physical training, the AI system fully stores students' training data including changes in posture improvement, standardization of movements, fluctuations of physical load and training progress, and accumulates individual growth trajectories. After phased training, the system automatically generates a personal training growth report covering progress, deficiencies, improvement obstacles, posture optimization rate, and increased physical fitness percentage.

Teachers judge core training problems accurately relying on visualized system data combined with post-adaptation training objectives, and distinguish posture defects, physical fitness shortages, and wrong training habits as different causes. Targeted adjustments are made to training priorities, intensity, contents, and rhythms. The dynamic closed-loop control mode overcomes rigid and blind traditional training and accumulation of problems. Students' physical development keeps pace with post requirements, their physical quality and professional postures are improved steadily, and training bottlenecks are broken continuously [15].

3. Conclusion

In summary, within the career-oriented physical training system of higher vocational colleges, AI visual motion capture provides core digital technical support for the implementation of personalized training programs. It effectively solves practical pain points including insufficient guidance precision and homogenized training contents as well as disconnection between education and post demands in traditional physical education. Based on multi-dimensional sports data, the technology can accurately match students' physical quality, posture weaknesses, and occupational physical standards of different majors, and standardize students' static postures and dynamic force habits throughout the whole process, so as to reduce occupational muscle strain and spinal deformation risks after employment from the source and effectively improve students' physical adaptability and long-term career development potential.

In the future, with the continuous iteration and upgrading of artificial visual technology, the professional and personalized physical training system built by AI visual motion capture can continuously accumulate complete training growth data of students and optimize the dynamic closed-loop training control mode. It will drive the simultaneous improvement of students' comprehensive physical fitness, standardized professional postures and post adaptability, provide clear and feasible practical paths for the professional and digital teaching reform of physical education in higher vocational colleges in the new era, and help colleges cultivate high-quality skilled talents with sound physical quality and post adaptability.

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