Research on STEAM Mode of Training Innovative Talents

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Abstract: In order to cultivate innovative talents with market competitiveness, college education concept and evaluation system need reform and innovation. According to STEAM multi-disciplinary comprehensive quality education theory, this paper analyzes the connotation and main characteristics of innovative talents, studies the existing problems of innovative talents training, evaluation indexes and training methods of innovative talents, and puts forward measures and methods for constructing innovative talents training mode. Through school-enterprise cooperation, project construction and improvement of innovation training system, curriculum system and training center will be constructed to improve innovation guidance service system. The theoretical and practical basis required for cultivating innovative talents improves the quality and level of talent cultivation, and is conducive to innovative talents' multi-disciplinary knowledge reserve, application of knowledge and skills, solving social problems and realizing technological innovation.

1. Introduction

In the new era of innovation-driven national economic development, innovative talents have a core position in the innovation-driven development strategy.Education should keep up with the pace of national development, implement the strategy of innovation-driven development, constantly innovate the mode of personnel training, and improve the education system and evaluation system.According to the innovation theory and talent cultivation theory, it is necessary to re-understand the existing problems of innovative talent cultivation and explore new cultivation methods.

The STEAM Education Concept began as an education initiative by the U.S. government to strengthen education for American students in science, technology, engineering, the arts, and mathematics.STEAM stands for Science, Technology, Engineering and Mathematics.Encourage the development and improvement of students' multi-disciplinary, cultivate their comprehensive quality, and thus enhance their global competitiveness.[1] Recently I joined Arts and became more comprehensive.

Research on STEM education theory and practice. Foreign research is more in-depth than domestic research.The development of innovation education in foreign countries is relatively early, while the innovation education in China is relatively slow.[2] In addition, the application-oriented undergraduate education in China has only been produced for more than ten years, so the training of application-oriented innovative talents is still in the exploratory stage.[3] Domestic research on applied innovative talents mainly focuses on the establishment of talent training mode, and there is a lack of detailed implementation plan in the establishment of talent training mode.[4] Foreign research on STEM education runs through the national, social and school levels, and a relatively systematic implementation plan for STEM education has been formed.[5] Most of the studies on STEM education by domestic scholars are about the development of STEM education abroad, the integration of STEM courses and teacher training.There are few studies on the enlightenment of STEM education on different stages of education in China. In the context of the shortage of applied

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innovative talents, STEM education, as an educational concept to cultivate innovative and complex talents, has a guiding and promoting role in the training of applied undergraduate innovative talents.[6]

According to STEM education theory and human capital theory, from the innovative talents evaluation, innovation ability training and teaching contents of creative personnel environment construction from four aspects, analyses the reason of innovative talent training experience difficulties, targeted put forward the countermeasures to solve the problem of innovative talent training, promote innovation talent training quality steadily improve.

2. Theories Related to Innovative Talent Training

2.1. Constructivist Learning Theory

The national economic development has entered the stage of innovation-driven development, in which the whole process of innovation-driven development is the most core capital.From both the demand side and the supply side, innovative talents are the core elements of economic development and new requirements for education in the new era.Higher education is the main base for cultivating innovative talents and shoulders the responsibility of cultivating innovative talents.

Constructivism believes that learning is a process of learners acquire knowledge actively, think learning is not simply an outside-in input and transfer of knowledge, but in the learning of the students in the group with peers, teachers, workers, interaction and sharing of your major constantly enrich and update their own understanding, and take the initiative to construct their own learning content, to acquire knowledge.The cultivation of innovative talents in application-oriented universities should follow the law of students' psychological development and stimulate students' interest in learning.Most of the traditional teaching methods are based on behaviorism theory, which emphasizes that students can passively receive the external stimulus and the knowledge instilled by teachers through the external stimulus mainly provided by teachers.This kind of teaching mode does not adapt to the cultivation of innovative talents, which makes the cultivation of innovative talents become an armchair strategy.

Constructivist teaching theory emphasizes that in the process of knowledge learning, learners, with the help of others, make use of their own knowledge experience and existing knowledge resources to construct meaning and acquire new knowledge.In the process of construction, the cognitive role of students is emphasized, students are the subject of knowledge construction, and teachers are the guide in the construction.Constructivism emphasizes the subject role of students in learning, stimulates students' initiative in learning, and is conducive to the cultivation of application-oriented innovative talents.STEM education is also based on constructivist theories.

2.2. STEM Multidisciplinary Education Theory

"STEM" is an acronym for Science, Technology, Engineering and Mathematics.In terms of content, STEM education advocates the integration of multi-disciplinary knowledge to achieve the integration of content, the learning of multi-disciplinary integrated knowledge, and a kind of education mode oriented by the cultivation of critical innovative thinking.Formally, STEM is the synthesis of knowledge, ability, quality and other elements.Without scientific knowledge as the basis, there will be no technological innovation, technological innovation without attitude and emotional guidance, lack of innovation motivation and the value of innovation.STEM literacy not only refers to knowledge and innovation ability, but also refers to the comprehensive learning process of knowledge, ability and quality.Therefore, STEM education is an advanced concept advocating interdisciplinary education and all-round training of innovative talents.

STEM education advocates a problem-sold-oriented education model, which requires the completion of works as a part of knowledge output. By integrating knowledge into the design of a work, it promotes the integration and transfer of knowledge. Therefore, design is the premise for the realization of STEM education model.In the design process of works, not only knowledge should be integrated into it, but also learners' learning motivation should be stimulated. Therefore, the design

of problems, works and projects should be interesting.The design of works is a process of cognitive construction, which must be put into practice through practical operation. Practicality is an important approach to STEM education, and STEM education has great advantages as well as practicality. Students can divergent thinking, solve original problems and create new problems in the specific practice process.STEM education aims to cultivate interdisciplinary talents with innovative abilities.

2.3. Connotation and Main Characteristics of Innovative Talents

Innovative talents are defined as having multi-disciplinary knowledge reserve, innovative observation and advanced innovative thinking, and can independently use knowledge and skills to solve social problems and make technological innovations

The main characteristics of creative talents：

Comprehensive knowledge. Knowledge reserve is the cornerstone of all talents training, innovative talents are no exception. Innovative talents should discover and create new knowledge on the basis of their own knowledge, so as to have a broader vision and richer information.

Strong motivation for innovation. Strong curiosity and thirst for knowledge are important components of internal innovation motivation. Driven by a strong thirst for knowledge, the subject is actively and persistently committed to research and research, which forms an effective endogenous power between the constant emergence of problems and the strong thirst for knowledge.

Creative and critical thinking. The cultivation of innovative thinking is the premise of the cultivation of innovative talents, as well as the most basic ability and quality structure that innovative talents should possess. Critical thinking negates old, established thinking and is uncomfortable with the status quo. The cultivation of innovative thinking is inseparable from critical thinking, which stimulates innovative thinking and action.

A keen observation. Keen observation can help people not be bound by the surface features of things, and directly see the essence and development trend of things. Most of the creative scientific discoveries and technological breakthroughs in history have been the result of careful observation. Connect the observed details with existing knowledge to generate unique insights and form innovative insights.

Rich imagination. Imagination is the source of knowledge and promotes the development of knowledge. Innovation is the innovation of old things and the invention and discovery of new things. They have rich imagination and can make breakthroughs in all aspects and get unique answers to common problems.

Tenacious will to innovate. In the process of innovation practice, there will be a lot of unpredictable difficulties, if there is no tenacious perseverance, will face the possibility of giving up half, perseverance will be an important force to ensure the process of innovation, innovation talents are mostly indomitable, use perseverance and toughness to achieve our goals.

3. Problems in the Cultivation of Innovative Talents in Colleges and Universities

3.1. Lack of Innovation in Educational Ideas

At present, China's application-oriented universities have a weak sense of innovation, both from the school level and from the student level.Applied undergraduate colleges and universities in recent years, in response to the development of the national innovation drive, a series of policies about innovative talent training, the innovation into the concept, but only in the form of call and publicity, lack of innovation into the key of each link, the education teaching not to implement innovation education.By school internal system mechanism and the influence of students' subjective consciousness, applied undergraduate college students for their talent cultivation orientation stays in the service of technology skilled talents for the society, and think that innovation is high level research university students should have the ability, as a result, their innovative consciousness is weak, lead to the cultivation of applied innovative talents lack a strong spiritual motive and tenacity

of innovation will.

3.2. Obsolete Teaching Methods and Methods

At present, the teaching methods of application-oriented universities in China are relatively old and lack of innovation.Mainly displays in: in the education teaching link, the applied undergraduate colleges and universities in our country and even the most colleges and universities is still emphasize take teachers as the main body of education, more is "speak, teach, teach" one-way output, interact with students, students to learn knowledge in a passive acceptance, lead to students' learning initiative and enthusiasm.In China's application-oriented undergraduate universities, the form of group learning, with project completion as the carrier, teacher guidance and students' independent learning, has not been paid attention to and popularized, and the quality of innovative talent cultivation cannot be improved.

The teaching method in Chinese universities is still traditional classroom teaching, with insufficient heuristic teaching, let alone exploratory teaching based on problem solving and project completion. Therefore, students only stay in the knowledge level, the cultivation of ability and quality is ignored, in the long run, college students' application ability, innovation ability and strong thirst for knowledge are virtually erased, as a result, it is difficult for students to adapt to the development of the society, it is difficult to achieve their own sustainable development.

In the age of information explosion, knowledge learning is no longer limited to classroom acquisition. However, at present, China still focuses on classroom teaching in school, with fixed textbooks as the main teaching content, and lacks self-study space and social practice courses. The main manifestations are as follows: insufficient investment in innovation base construction; The school is short of innovative professional guidance teachers and insufficient funds for activities; Schools are not closely associated with social enterprises. The learning content is one-sided and backward. As a result, the limitation of students' innovative thinking is not conducive to the cultivation of innovative talents in application-oriented colleges and universities.

3.3. Discipline Barriers are too Rigid

At present, the curriculum is set up according to the professional knowledge, ability and quality structure required by the job, instead of taking sustainable development and the comprehensiveness and divergence of talents as the starting point. As a result, the curriculum is too limited, lacks comprehensiveness and students' learning content is not comprehensive. In addition, the lack of subject-oriented curriculum, interdisciplinary curriculum, interdisciplinary curriculum and other issues. At present, with the rapid development of economy and society, the professional requirements for talents are also changing, and the courses set according to the major can not meet the needs of talent training. The curriculum is too heavy, students are unable to acquire knowledge of other subjects, and their thinking is restricted. At the same time, theory courses and practice courses in the curriculum is not closely related. In the theoretical learning stage, students are exposed to a lot of theoretical knowledge, but can not be verified by concrete practice. However, in the practical stage, because of the distance from theoretical learning, it is difficult to apply it to practical operation, so theoretical courses and practical courses should be closely linked to realize the practical application of the knowledge learned.

3.4. Imperfect Evaluation Mechanism

At present, the content of evaluation for students in Application-oriented universities in China is mainly to assess the students' mastery and application of the knowledge they have learned, and to evaluate the students with deterministic answers as the standard.Innovative talents are the type of talents with collaborative development of knowledge, ability, quality and personality. Such knowledge assessment method has great limitations and has a restrictive effect on students' innovation ability and innovative thinking, which is not conducive to the cultivation of innovative talents.Therefore, the evaluation of knowledge, ability, quality and personality should be emphasized in the evaluation of innovative talents.

The traditional form of written examination is the main way of student evaluation in the

application-oriented universities and even some institutions of higher learning in China.Most applied undergraduate universities in Our country take teachers as the subject of assessment, which makes students become passive evaluators and weakens the initiative and enthusiasm of students to participate in evaluation.In addition, application-oriented innovative talents are talents who directly serve the society. In their talent evaluation, the society, enterprises and schools should all participate in the process. A single school teacher as the main body will result in the phenomenon that the quality of talent cultivation is divorced from the society.

4. Measures to Build Innovative Talent Training Mode

4.1. Reconstruction of the Comprehensive Curriculum System

Build an innovative talent training model for application-oriented undergraduate universities by integrating STEM education concepts, draw on the practical experience of applying STEM education concepts at home and abroad, analyze the high consistency between STEM education concepts and application-oriented undergraduate innovative talent training, and realize the localization of STEM education according to the rules of higher education in China.Draw lessons from STEM education concept to construct the innovative talent training model of application-oriented universities from the guiding ideology and principles, basic content and implementation path.

In the reform of education and teaching, curriculum teaching is the core content and central link of talent training, and the reform of curriculum system is the most important step of education and teaching reform and the breakthrough point of education reform.Curriculum reform and teaching reform are the core of the reform of innovative talent training mode in application-oriented universities.Interdisciplinary core idea, in this study using STEM education based on professional required course content and strengthen the existing theory and practice of the course, to achieve the continuity of the course content and comprehensive, will be more courses according to certain logical relationship, integrated with explicit knowledge, ability and quality target of wide-area integrated curriculum, eventually form to train applied innovative talents for a comprehensive curriculum system.

4.2. Innovative Teaching Methods and Methods

Optimize teaching methods. The mode of industry-university-research cooperation is the future development trend of application-oriented undergraduate colleges and an important way to train application-oriented innovative talents. It is of great significance to students' frontier knowledge learning, practical application ability improvement, innovation ability and comprehensive quality cultivation. However, the current industry-university-research cooperation still stays at the surface level, unable to achieve in-depth cooperation. In school-enterprise cooperation, curriculum content objectives can be set from the perspective of students' own development rules and industry development status, and the technical requirements, work ability and quality requirements of industry enterprises can be integrated into the curriculum content objectives, so as to form a close connection between curriculum implementation and social enterprises.

4.3. Construction of Diversification Evaluation Mechanism

The evaluation of applied innovative talents should be based on the whole knowledge, ability and quality.In the past, the assessment content of applied innovative talents in education mostly stayed in the level of knowledge structure, and the assessment of ability and quality was insufficient.Applied innovative talents are the core features of application and innovation, ability and quality structure is an important part of applied innovative talents, evaluation content should contain ability and quality structure, should fully realize the diversity of students' intelligence, respect the differences of students, therefore, on the examination content, prominence should be given to the evaluation of innovation quality and innovation ability, pay attention to the comprehensive content, to promote all-round development applied creative talents.

The cultivation of application-oriented innovative talents is closely related to the social demand for talents. The social demand for application-oriented innovative talents changes with the change of The Times and the continuous improvement of technology.The evaluation of application-oriented innovative talents should not be based on the social demand, and the quantitative evaluation of students should be carried out only by the single subject of university teachers, which should keep dynamic consistent with the development and demand of the society.In the selection of specific indicators and the setting of relevant weights, the principle of dynamism should be embodied, and the specific indicators and weights of the evaluation system should be dynamically adjusted in real time, so as to meet the needs of The Times.Social enterprises and employers should participate in the formulation of talent evaluation standards and the process of talent evaluation, and participate in talent evaluation in coordination with university education and management personnel according to the development of society.

5. Conclusion

(1) Practitioners who have received STEM education generally have strong technical level and innovation ability.In the United States to promote the level of science and technology and innovation capacity.

(2) In recent years, STEM education has produced a series of good effects in China, promoting the change of teachers' concepts and teaching behaviors.

(3) Project-based STEM courses fundamentally change the traditional classroom landscape in which teachers are the subject and students learn passively, and form a learning atmosphere of independent exploration, innovation and creation.

(4) The characteristics of STEM education concept and applied innovative talents are highly compatible.It is of great significance to draw on the STEM education concept when constructing the innovative talent training model for application-oriented universities.

(5) The remarkable characteristic of the development of modern science and technology is the continuous high degree of integration of disciplines.The acquisition of major scientific and technological achievements depends more and more on the intersections and integration of different disciplines, which requires comprehensive knowledge reserve and learning transfer.t.

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