

Research on the Cultivation Mode and Path of Innovation and Entrepreneurship Ability of Computer and Electronic Engineering College Students under the Background of Artificial Intelligence

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Abstract: As a disruptive technology, artificial intelligence has affected global economic development on multiple levels. With the widespread application of artificial intelligence technology in various industries, the market demand for artificial intelligence technology and applications continues to grow, providing college students with opportunities to participate in emerging industries. College students can create new products and services and achieve technological innovation with the continuous development of artificial intelligence technology. This paper adopts the method of literature review, and combines the existing artificial intelligence background to explore the possibility of using artificial intelligence as an auxiliary tool for cultivating college students' innovation and entrepreneurship ability. Combining cutting-edge theories with a variety of practical explorations, this paper finally forms a set of methodologies for computer and electronic engineering college students to complete learning and entrepreneurial practice through artificial intelligence in the stage of university education.

Keywords: Artificial intelligence, computer and electronic engineering, innovation and entrepreneurship, practice, education.

1. Introduction

Artificial intelligence (AI) has now developed into a cutting-edge discipline in the field of science and technology, and has had a huge impact on the world. Countries around the world have invested a lot of resources in cutting-edge research, technology development, and education and training in AI [1]. In 2016, the White House Office of the United States released a report titled 'Preparing for the Future of Artificial Intelligence', which discussed how AI has accelerated technological, social, and economic changes, and the need for the US government to increase investment in AI education and training and research and development to cope with the impact of changes on all aspects of society [2]. In 2017, the State Council of China released a report titled 'New Generation Artificial Intelligence Development Plan', which proposed the guiding ideology, strategic goals, key tasks, and safeguards for the development of China's new generation of AI by 2030. And as such, it aims to build China's first-mover advantage in the development of AI, thereby accelerating the pace of

building an innovative country and a world science and technology power [3]. The report also proposed to build an open and collaborative AI science and technology innovation system, cutting-edge basic theories, and key common technologies [3]. In addition, in 2018, the European Commission released a report entitled ‘Artificial Intelligence-A European approach to excellence and trust’, which elaborated on the EU's views and strategies on the development of AI, and aims [4]. ‘Artificial Intelligence-A European approach to excellence and trust’ is aimed at positioning Europe as a global leader in AI research, development, and deployment. The report outlines a framework for fostering AI innovation while ensuring that it is developed and used responsibly, ethically, and transparently [4].

As countries around the world promote the globalization of AI, it will have a certain impact on the world's economic and social forms in the future. The demand for employees with basic operational and repetitive operational skills will continue to decline, while the demand for talents with complex logical thinking, dialectical thinking and other abilities will rise sharply. From the perspective of economic development, the globalization of AI has promoted a significant increase in production efficiency and the optimization and upgrading of industrial structure. Traditional labor-intensive industries are gradually replaced by automation and intelligence, while emerging high-tech industries have become an important driving force for economic growth. This makes economic development more dependent on technological innovation and knowledge updating, thus putting forward higher standards for employees' technical requirements.

The gap between the needs of society and enterprises and college students, and the market opportunities brought about by the rapid development of AI, determine that the current training of cutting-edge scientific and technological talents and AI talents is very important and urgent for college students' innovation and entrepreneurship education. As the backbone of future AI talents, college students majoring in computer and electronic engineering should cultivate their ability to find the way to innovation and entrepreneurship from the new market pattern. Therefore, this paper proposes a scientific and effective model for cultivating college students' innovation and entrepreneurship ability through theoretical analysis and case analysis, aiming to solve the deficiencies of college students' innovative thinking ability, entrepreneurial spirit and practical ability, especially college students majoring in computer and electronic engineering. The research in this paper provides theoretical support and practical guidance for college students' innovation and entrepreneurship education, which is helpful to cultivate more talents with innovative thinking and entrepreneurial spirit to meet the needs of social and economic development.

2. Artificial Intelligence-related Courses

In recent years, many universities have opened courses related to AI, which can effectively help students understand the cutting-edge technologies of AI.

2.1. Stanford University

The Department of Computer Science at Stanford University offers a number of courses related to AI, including but not limited to machine learning, natural language processing, computer vision, etc. Machine Learning course provides a broad introduction to machine learning and statistical pattern recognition, including supervised learning, unsupervised learning, learning theory, reinforcement learning and adaptive control[5]. In Natural Language Processing with Deep Learning course, students will gain a thorough introduction to both the basics of Deep Learning for NLP and the latest cutting-edge research on Large Language Models (LLMs) [6]. Deep Learning for Computer Vision is a course that a deep dive into the details of deep learning architectures with a focus on learning end-to-end models for these tasks, particularly image classification[7].

2.2. Massachusetts Institute of Technology

MIT offers a number of courses related to AI, including machine learning, natural language processing, computer vision, etc. AI introduces representations and algorithms used to build AI systems in robotics, language, vision, etc. Over the past decade, interest in machine learning research has spiked drastically, with advancements in deep learning being a significant driving force. Indeed, deep learning has transformed many areas in computer science including computer vision, natural language processing, and reinforcement learning.

And to popularize machine learning, the university offers short courses, such as a 3-day course on embedded machine learning concepts that focuses on exploring ML concepts such as speech and gesture recognition. Lectures and instructor-led labs combined with Infineon PSoC 6 development kits and shields develop students' ability to create ML projects.

2.3. Commonality of course settings

In the study of the current computer course settings in major universities, it was found that the current trend of course settings is that the course settings of computer AI courses have maximized the use of interdisciplinary integration, such as combining with psychology, biology, economics and other majors, in order to broaden students' horizons and enhance problem-solving skills. In addition, these courses all emphasize the importance of combining practice with theory. Most top universities' AI courses will add certain practical links, such as project assignments and internship opportunities, so that students can apply theoretical knowledge to practical problems and improve their hands-on and problem-solving abilities.

The combination of basic theoretical knowledge and practice, cross-disciplinary integration and other course optimization measures have improved the overall quality of students after graduation, and they can transform their abilities into employability in a short period of time. At the same time, diversified vision and solid technical capabilities also provide excellent basic conditions for students to innovate and start businesses after graduation.

3. Innovation and entrepreneurship education in higher education

3.1. United States

Universities in the United States generally attach great importance to innovation and entrepreneurship education, and cultivate students' innovation awareness and entrepreneurial ability through a variety of curriculum systems and practical activities.

Many famous universities offer a wealth of innovation and entrepreneurship courses, which often cover multiple aspects such as innovation theory, innovation methods and innovation practice. For example, the Y-Prize competition of the University of Pennsylvania. This competition simulates the real market environment and allows students to learn how to transform ideas into business plans in practice [8]. Stanford University designed the "Startup Garage" course for students who are interested in entrepreneurship. By building corresponding business scenarios, students can master the process and risks of business operations in the simulation of implementing their business plans [9]. In addition, the entrepreneurship courses offered by the University of Maryland are also very rich, covering all aspects from innovative ideas to company development.

In addition, American universities attach great importance to the transformation of scientific research results and the incubation of student enterprises. Universities will provide certain fund support and venue support for student enterprise incubation. Take the University of Maryland International Technology Incubator as an example. The University of Maryland has three business incubators, which were established in 1987 and have actively promoted the transformation of

scientific and technological achievements of teachers and students for more than 20 years. By 2023, more than 1,000 companies have been successfully incubated, including Medimmune, Martek and other large companies with a current output value of billions of dollars. [10]

3.2. Europe

European universities are also actively exploring innovative and entrepreneurial education models. The "Entrepreneurship Centre" of the University of Cambridge provides a series of entrepreneurial training programs, including entrepreneurial camps and entrepreneurial challenges, aiming to cultivate students' innovative thinking and entrepreneurial skills[11]. At the same time, the University of Dublin provides students with a full range of entrepreneurial training and support systems through the Innovation Academy and the entrepreneurial incubator Nova UCD. The entrepreneurial incubator (Nova UCD) provides various services for students to start companies, and will conduct market evaluations on the designs and research results of teachers and researchers, providing venues and opportunities for innovative entrepreneurship while providing specific plans and suggestions[12].

3.3. China

China's top universities are also working hard to improve and optimize innovative and entrepreneurial education. Among them, Tsinghua University provides students with personalized entrepreneurial guidance and support through the Maker Practice Education Center and the mentor team[13].

In addition, some universities have established entrepreneurial incubators, laboratories and practice bases to simulate the real market environment and provide students with opportunities to practice entrepreneurship. For example, the "College Student Innovation and Entrepreneurship Practice Base" jointly built by Ocean University of China and Qingdao Industrial Technology Research Institute provides professional entrepreneurship training and guidance to help students transform their ideas into viable business plans [14]. The School of Innovation and Entrepreneurship of Dalian University of Technology has built a joint school-enterprise training platform, namely the AI innovation and entrepreneurship training platform. The platform takes AI as an opportunity and "deep learning" as the entry point to cultivate students' innovation and entrepreneurship practical abilities from all aspects, including theoretical knowledge teaching, practical hands-on ability training, scientific research and innovation ability training, enterprise training opportunities, and teamwork ability training [1].

What is the relationship between innovation and entrepreneurship education and artificial intelligence-related course settings?

4. Discussion

Based on the current application of AI in the industry and the social demand for AI to change living conditions, computer and other related majors have become important areas for talent training in major universities in various countries. Based on the current employment pressure and the social demand for technical talents and industries, college students in computer AI and other technical fields have become important training targets for innovation and entrepreneurship education in universities. As an important field for industry and talent incubation, the commercialization of research results related to machine learning and computers is the main means for universities to cultivate college students' ability to find the path of innovation and entrepreneurship from the new market pattern.

In view of the above analysis, a scientific and effective model for cultivating college students' innovation and entrepreneurship ability requires universities to provide professional help and guidance from curriculum optimization to entrepreneurial ability training, so as to fundamentally improve college students' innovative thinking ability and practical ability required for entrepreneurship. Efficient entrepreneurial ability training for college students in computer and electronic engineering majors is of great significance to the training of talents in schools and societies around the world.

In addition, the development of AI combined with different industries can also promote industrialization reform in society, increase economic diversity, improve the quality and level of life of citizens, and meet the development needs of society and economy in many aspects.

5. Conclusion

Universities need to set up AI courses based on their own advantages, through interdisciplinary, practical and theoretical methods, so that students can get all-round training and development. The requirements for talents in the era of AI are highly consistent with the goals of innovation and entrepreneurship education. This education model aims to cultivate innovative and entrepreneurial talents who can adapt to the AI era. These talents need to have high-level qualities and abilities and be able to carry out interdisciplinary innovation in the field of AI. The cultivation of college students is a strategic and far-reaching topic in any country. Only by mastering the core technology and the spirit of innovation can we find opportunities in the ever-changing global market. This article's summary of global AI innovation and entrepreneurship courses may not be comprehensive, and it cannot truly summarize all aspects of AI in the field of innovation and entrepreneurship around the world. It is necessary to continue to go deep into the courses to understand and discover. Future research will focus on how each sub-field of AI can play a role in innovation and entrepreneurship, and ultimately form a methodology for linking with the market.

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