Study on the Differentiated Training Model for Electronic Information Professionals Oriented Towards the New Economy

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Abstract: With the rapid development of the new economy, the demand for multi-level professionals in electronic information continues to grow, yet traditional training models struggle to meet industry needs due to outdated curricula and insufficient practical experience. This paper proposes a differentiated training model oriented toward the new economy, which classifies students into basic, application, and innovation layers according to their interests, abilities, and career plans. Each layer has specific training objectives and curricula: the basic layer focuses on theoretical foundations, the application layer emphasizes engineering practice, and the innovation layer cultivates cutting-edge skills and innovative thinking. Through tailored course design, teaching methods, university-enterprise cooperation, and innovation platforms, the model enhances students' industry adaptability and job market competitiveness. Practical research shows that this approach improves both the efficiency of educational resource utilization and the quality of professionals trained. The paper concludes by discussing implementation challenges and offering suggestions for improvement.

Keywords: New Economy; Electronic Information Professionals; Differentiated Training Model

1. Introduction

With the rapid development of the new economy, there is an increasing demand for high-quality, multi-level professionals in the electronic information industry. However, such a rapidly evolving demand in the industry is hardly satisfied by the current training model for electronic information related majors in universities due to it focus on pure basic theories instead of timely updates on emerging technologies and development of practical abilities. Particularly, the traditional unified training model does not provide personalized development paths based on the differentiated needs of students, leading to their diminished innovative ability and adaptability to the industry [1]. Therefore, designing a differentiated training model for electronic information professionals oriented towards the new economy is particularly important. The proposed model classifies students into the basic layer, the application layer and the innovation layer, based on their interests, abilities and career development directions. Tailored [2] training programs are developed to satisfy the demand for diversified professionals. Concurrently, students' abilities in theoretical learning, engineering practice and interdisciplinary integration are developed by optimizing the curriculum system and strengthening practice. In addition, the effective implementation of the differentiated training model also relies on comprehensive efforts such as policy support [3], faculty capacity building and university-enterprise cooperation, in order to ensure a steady supply of high-quality professionals for the electronic information industry in the context of the new economy. Therefore, studying and exploring the design and implementation path of the differentiated training model is of paramount importance as this will improve the quality of education, promote the university-industry integration, and cultivate innovative professionals that meet future economic needs.

2. Current Training of Electronic Information Professionals and Problem Analysis

2.1 Advantages and Disadvantages of Current Training Model

The current training model for electronic information professionals centers on basic theories and emphasizes the breadth and comprehensiveness of knowledge. However, with the continuous development of technology and the evolution of industry demands, some shortcomings of this model become apparent. A primary problem is the outdated course content, as the traditional training model tends to prioritize courses such as mathematics, physics, and computer fundamentals while paying less attention to emerging technologies such as artificial intelligence, big data, and the IoT [4]. As a result, students are not sufficiently qualified to cope with the rapidly evolving cutting-edge technologies and to adapt to industry changes quickly, despite their solid mastery of basic knowledge. Moreover, insufficient practice [5] is also a major problem in the current training model. Although many colleges and universities attach importance to the combination of theoretical teaching and practical courses, there are still limited opportunities to align the course content with practical industry demands. While most students may know some theoretical and practical knowledge upon graduation, they lack practical experience in connecting with real-world engineering projects. With respect to the rapidly evolving electronic information technology, the traditional theoretical and practical teaching is less likely to cultivate high-level professionals equipped with practical operational abilities and innovative thinking. As a result, students often need additional training or an adaptation period before they are able to play their due role in the workplace. Furthermore, the current training model tends to ignore the personalized development needs of students. In most universities, there are unified curriculum schedule and teaching progress for electronic information related majors. This “one-size-fits-all” approach fails to fully allow for students’ interests, strengths and career plans. Even though some students may show strong interest and potential in certain technical areas, the current training model is less likely to stimulate their initiative and creativity due to a lack of flexible course choices and in-depth training.

2.2 Necessity and Advantages of Differentiated Training

The differentiated training model is an innovative solution to tackle the limitations of the current educational model [6]. By differentiating students based on their interests, abilities and development directions, the proposed model provides a personalized training path for students that avoid the uniformity of the traditional training model [7]. It effectively addresses the problems of outdated course content and insufficient practice. Students at the basic layer focus on mastering solid theoretical knowledge while accumulating practical experience through simple experiments. Students at the application layer and the innovation layer focus on improving their practical and innovative abilities by participating in industry projects, scientific research innovation and interdisciplinary cooperation [8]. In addition, differentiated training can better satisfy the demand of the new economy for high-quality, multidisciplinary professionals. With the continuous development of technologies such as artificial intelligence, big data, and the IoT, the industry demand for professionals is increasingly nuanced. Differentiated training allows students to pursue further studies along the selected paths suitable for themselves. Students specializing in technological R&D [9] may participate in innovative scientific research projects, while students oriented towards engineering applications may improve their ability to solve practical problems through practical projects and enterprise cooperation. In this way, the industry demand for diversified professionals can be satisfied. Differentiated training also improves the utilization efficiency of educational resources. Different from the traditional training model, the differentiated training model reasonably allocates resources based on the needs of students to ensure tailored and effective teaching, which enables students at all layers to fully develop in respective suitable fields. Furthermore, the personalized training path helps students realize their potential by stimulating their interests and motivation, culminating in training innovative and multidisciplinary professionals that meet the demand during the new economy era [10].

3. Design of Differentiated Training Model for Electronic Information Professionals Oriented Towards the New Economy

3.1 Differentiation Objectives and Layering

In order to accommodate the demand of the electronic information industry for high-quality, multi-level professionals during the new economy era, the differentiated training model should provide personalized training based on students' interests, abilities and career plans. The differentiation objectives should be designed with full consideration to the characteristics and development potential of students, combined with the industry demand, and the training directions for professionals at different layers should be clarified, in order to ensure reasonable allocation of educational resources and targeted instruction. The differentiation objectives are achieved by classifying students into the basic layer, the application layer and the innovation layer, each with clear training objectives, as shown in Figure 1. The basic layer primarily includes students with weak academic foundation or newly admitted students, with the training objective of ensuring the students solidly master the basic theories and technologies in the electronic information discipline, especially core courses such as mathematics, physics, and computer fundamentals, in order to lay a solid foundation for further studies. The learning focus of students at the basic layer is on building a core knowledge framework on the electronic information discipline through the study of basic courses, as well as developing students' disciplinary literacy and learning ability. Meanwhile, students at the basic layer enhance their hands-on abilities by participating in experiments and basic projects, thereby laying a good practical foundation for progression into the application layer. The application layer includes students who already have a foundation, with the training objective of improving their engineering practice and industry application abilities. Students at the application layer need to master more specific technologies and methods and develop the ability to solve practical problems through course practice, project cooperation and industry internships. The curriculum design for the application layer includes embedded systems, data analysis and communication technology. Students will participate in enterprise cooperation projects to improve their ability to apply engineering technologies and adaptability to the industry. Through practice, they are exposed to real-world engineering problems, enhance their practical operational abilities, and prepare themselves for the workplace. The innovation layer includes students with strong innovative ability and huge scientific research potential, with the training objective of improving their technology R&D ability and innovative thinking. Students at the innovation layer will participate in scientific research projects and interdisciplinary cooperation, through which they will deeply understand artificial intelligence, big data, IoT and other cutting-edge technologies and improve their scientific research and technological innovation abilities. They will tap their innovation potential and accumulate experience during the process of technology R&D through scientific research platforms, technological innovation competitions and other approaches. They will also promote technological progress, contributing to the technological development of the industry.

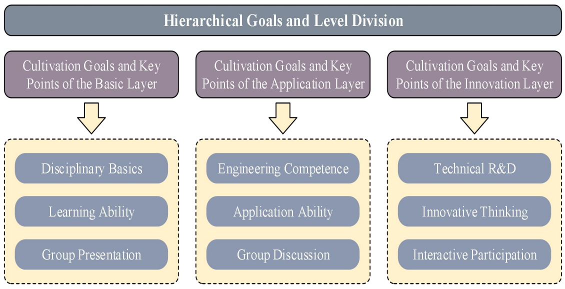

Figure 1. Differentiation Objectives and Layering Structure

3.2 Curriculum and Teaching Content Design

Based on the established differentiation objectives, the curriculum system design should be closely aligned with various needs of students at all layers, in order to ensure that the teaching content not only corresponds to the cognitive levels of students but also satisfies the practical demands of the industry and society for professionals. In order to accommodate the needs of students at all layers, the curriculum design should cover three modules: basic courses, application courses, and innovation courses, as shown in Figure 2. The curriculum system for students at the basic layer should focus on consolidating the disciplinary foundation and developing students' disciplinary thinking and problem analysis ability. The curriculum content should cover the core disciplines in electronic information related majors, such as digital circuits, analog circuits, linear algebra, probability theory, and mathematical statistics, which help students build a solid theoretical foundation and support further studies of more complex courses. The curriculum design for students at the application layer should be inclined to engineering practice and technology applications, and the curriculum content should not only include in-depth professional technologies such as embedded systems, network security and communication principles but also focus on students' project practice abilities and adaptability to the industry. Project-based teaching should be introduced to support students in learning how to apply theory to engineering practice when faced with practical problems, thereby developing their ability to apply engineering technology. The curriculum content for students at the innovation layer should be more cutting-edge, with the focus on developing technological innovation and scientific research abilities. While involving areas such as artificial intelligence, machine learning, big data processing, and cloud computing, it should also incorporate interdisciplinary knowledge on medicine, engineering, economics and other fields. Students are encouraged to pursue technological innovation and scientific research breakthroughs. In addition, a "mentor system" or scientific research projects should be introduced to help students develop independent thinking and problem-solving skills in real-world scientific research. Based on the layering and practical needs of students, the curriculum design should not only allow for the depth of disciplinary knowledge, but also embrace the technological frontiers shaping the development of the new economy, in order to ensure that students master the core skills required in the future industry.

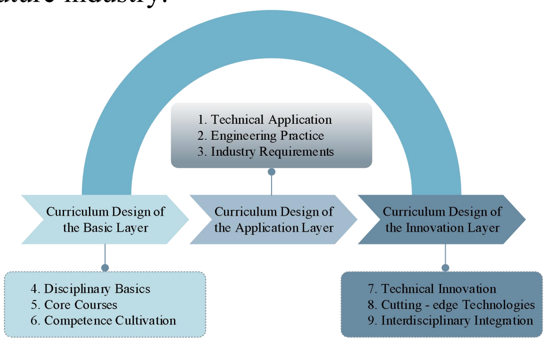

Figure 2. Curriculum and Teaching Content Design

3.3 Teaching Methods and Evaluation System

3.3.1 Design of Teaching Methods: The teaching methods should be flexible and diverse. Differentiated teaching means and methods tailored to students at all layers should be adopted. For students at the basic layer, an "instruction-oriented" teaching method should be employed, with the aim of helping students lay a sound foundation and develop disciplinary thinking through classroom instruction, experimental classes and online learning. For students at the application layer, a "practice-oriented" project-based learning approach should be employed to guide students to learn engineering problem-solving skills by participating in practical projects which can be industry cooperation projects, innovation competitions, or engagement in solving the practical problems faced by enterprises, all with the aim of enhancing students' practical operational abilities. For students at the innovation layer, an "exploration and research oriented" teaching method should be employed to encourage students to participate in the research and exploration of cutting-edge technologies. Scientific research projects, academic paper writing, innovative experiments and other activities conducted under the guidance of mentors should be introduced to stimulate students' innovative thinking and scientific research ability. These differentiated teaching methods can better satisfy the learning needs of different students and develop their comprehensive quality and ability.

3.3.2 Design of Evaluation System: The evaluation system should be designed in alignment with the training objectives tailored for students at all layers, with both flexibility and scientific rigor. For students at the basic layer, the evaluation should focus on the mastery of knowledge and take on the forms of final examinations, classroom quizzes, and experimental reports aimed to test their comprehension and application of basic theories and disciplinary concepts. For students at the application layer, the focus of evaluation shifts to their practical abilities and engineering problem-solving skills. In addition to final examinations, other evaluation forms such as project outcomes, industry internship reports and engineering design evaluation should also be employed to test students' technology application ability, problem-solving skills and teamwork in practical engineering projects. In addition, project presentation and teamwork evaluation are also ideal forms to further test their engineering thinking and practical abilities. For students at the innovation layer, the evaluation should focus on their innovative and scientific research abilities. This is mainly achieved through academic papers, completion of scientific research projects, and innovative experiment results. Concurrently, academic exchanges, transformation of innovative results and technology competitions can be introduced to comprehensively evaluate students' scientific research ability, innovative thinking and practical application abilities. Their performance in technology transfer and interdisciplinary cooperation should also be incorporated into the evaluation.

4. Implementation of Differentiated Training Model for Electronic Information Related Majors in a Particular University

The differentiated training model provides personalized training tailored to the academic abilities and career interests of students and maximizes the potential of each student. Universities classify students into three layers, namely the basic layer, the application layer and the innovation layer, with differentiated teaching and practical arrangements for students at all layers. Students at the basic layer focus on studying theoretical courses, and the course content includes basic knowledge on disciplines such as mathematics, physics, and computer fundamentals, with the aim of laying a solid academic foundation for further in-depth studies and practice. Students at the basic layer can improve their disciplinary thinking and analysis ability through solid theoretical learning, thereby ensuring a robust professional foundation. Students at the application layer focus on the development of practical skills and develop the ability to solve problems in real-work work scenarios by learning courses such as embedded systems, data communication and network security, in combination with enterprise cooperation projects and engineering practice. While participating in these projects, students are able to transform their theoretical knowledge into practical operational abilities, enhance their engineering application abilities, and better adapt to industry demands. Students at the innovation layer focus on cutting-edge technologies and scientific research projects, and the course content includes high-tech fields such as artificial intelligence, big data, and the IoT. Universities encourage these students to participate in relevant research projects, technological innovation and interdisciplinary cooperation, with the aim of improving their innovative thinking, scientific research ability and technical leadership skills. In addition, universities also seek to provide more practice opportunities for students through project-based learning, internships both on and off campus, and enterprise cooperation, enabling them to accumulate experience in real-world engineering projects. This differentiated training model comprehensively improves students' academic, practical and innovative abilities. The implementation of the differentiated training model has significantly improved the employment rate of university graduates. In particular, students at the application and innovation layers have demonstrated remarkable adaptability and innovative ability during internships in enterprises and project practice. Many students were directly employed by enterprises upon completion of internship, while the enterprises thought highly of the comprehensive quality of these students, acknowledging that they not only have a solid theoretical foundation but also have the ability to flexibly apply the technology they have learned to solve practical problems. On the whole, the differentiated training model not only enhances students' academic ability, but also significantly improves their practical operational and innovative abilities, earning widespread recognition from both the community and the industry.

5. Conclusion

This study discusses the implementation and effect of a differentiated training model for electronic information professionals. The findings show that the proposed model effectively addresses the shortcomings of the traditional training model, such as outdated curricula, inadequate practice, and a lack of personalized development opportunities for students. By classifying students into the basic layer, the application layer and the innovation layer, universities can provide tailored courses and practice opportunities based on the needs of students at all layers to improve their academic, practical and innovative abilities. Particularly in enterprise cooperation and project practice, students at the application layer and the innovation layer are outstanding, whose employment rate and adaptability to the industry are substantially improved. The differentiated training model provides an innovative solution for the training of professionals in the context of new economy and is able to better satisfy the demand for multi-level and multidisciplinary professionals in the electronic information industry.

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References

[1] Granić, A. Educational technology adoption: A systematic review. Education and Information Technologies 2022, 27(7), 9725-9744.
[2] Hawkridge, D. New information technology in education. Routledge, 2022.
[3] Akramova, H. Integration of information technologies in the educational process of general and special schools. Mental Enlightenment Scientific-Methodological Journal 2020, 2020(1), 66-75.
[4] Akhmedova, Z. Theoretical Foundations for the Creation of Electronic Interactive Educational and Programming in the Topic “Computer Science and Information TECHNOLOGY”. International Journal of Innovations in Engineering Research and Technology 2022, 9(04), 150-152.
[5] Musaev, M.; Rakhmatullaev, M.; Normatov, S.; Shukurov, K.; Abdullaeva, M. Integrated intelligent system for scientific and educational information retrieval. In Proceedings of the ENVIRONMENT. TECHNOLOGY. RESOURCES. Proceeding of the International Scientific and Practical Conference, 2024, Vol. 2, pp. 212–219.
[6] Haristiani, N.; Al Husaeni; D. N.; Judiasri; M. D.; Herniwati, H. Exploring global research trends on the integration of information technology in pragmatic studies: A bibliometric analysis. ASEAN Journal of Educational Research and Technology 2025, 4(2), 195-214.
[7] Vásquez-Pajuelo, L.; Rodriguez-Barboza, J. R.; Bartra-Rivero, K. R.; Quintanilla-Alarcón, E. A.; Vega-Jaime, W. Digital challenges: The need to improve the use of information technologies in teaching. Data and Metadata 2024, 3, 216-216.
[8] Smirani, L.; Boulahia, J. Using the unified theory of acceptance and use of technology to investigate the adoption of open educational resources by faculty members. International Journal of Information Technology 2022, 14(6), 3201-3211.
[9] Turakulovich, O. Basic principles and rules of innovative pedagogical technologies in the educational process. Multidisciplinary Journal of Science and Technology 2024, 4(3), 836-843.
[10] Huang, R. Educational technology a primer for the 21st century. Springer Nature Singapore Pte Ltd., 2019.