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# AI-Enabled Multi-Mode Electronic Information Innovation Practice Teaching Reform Prediction and Exploration in Application-Oriented Universities

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**Abstract:** In view of professional learning and practical training in traditional electronic information education of application-oriented universities, this paper constructs electronic information–innovation practice teaching reform (EI-IPTR).In this scheme, by an integrating artificial intelligence (AI)-enabled curriculum with a multi-mode integrated platform and open-style module, big data-based comprehensive education resources are optimally configured. We jointly perform the multi-mode construction of innovative practice teaching, professional education stage design, and teaching management improvement, respectively. Subsequently, new practice teaching mechanisms with information technology and its implementation and management methods are established to achieve better teaching effects. It first strengthens learning and intra-group competition to promote students' innovation in competitions. Then, the AI technique, i.e., attention mechanism-aided long short-term memory (LSTM), is used to model individual students' abilities. Thus, it accurately evaluates them for teachers to efficiently manage their teaching process in accordance with their aptitude. The teaching reform practice verifies that the AI-enabled big data optimization of teaching reform has a better effect by the above multi-mode innovation. It exhibits an obvious improvement in the quantity and quality of students' professional knowledge, personal ability, teamwork, and innovative practice. It is also in accordance with the independent completion of practical course teaching in the analysis of big education data. In addition, it realizes high-quality practical teaching by combining multi-mode, multi-level, and open discipline foundations together with efficient, professional skills.

**Keywords:** big data of education; LSTM model with attention mechanism; AI-aided education reform; creative personnel cultivation; practical education reform prediction and evaluation



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## 1. Introduction

Nowadays, the teaching mode driven by factors is turning into an innovation-driven one [1]. Problem-based learning is a kind of student-centered teaching with autonomous learning to stimulate subjective initiative. College students, whose role is to engage in innovation-driven development strategy and entrepreneurship, are the group with the most innovation and potential [2]. In the rapid development of big data, to improve the effectiveness of practical teaching, it is also necessary to adopt big data to optimize and improve innovative practice teaching and laboratory management [3]. However, practical teaching also reflects that college students generally lack the ability to integrate theory with practice; there is also low vision and poor technology tracking and innovation ability in practice [4,5]. Hence, it is necessary to carry out teaching reform of electronic information–innovation practice (EI-IP) to improve students' innovative spirit and practical ability [6]. The core of innovative education is to cultivate college students' innovative spirit, consciousness, and ability. It guides higher education to constantly update educational concepts and reform personnel training models. It also improves educational content and methods; thus, it closely integrates scientific research, personnel training, and social services together. Therefore, it transforms from emphasizing knowledge inculcation to focus on professional ability and innovative quality, thus improving the quality of personnel training [7,8].

At present, the demand for talent in electronic information enterprises shows the following significant characteristics. First, it keeps up with the new purpose and trend of enterprise development [9]. It highlights the demand-oriented characteristics and cultivates innovative talents to integrate and develop the industrial economy. Second, it adapts to the needs of students' interests, concepts, and other characteristics, and it cultivates professionals with comprehensive professional knowledge and rich experience [10]. Therefore, under the big data analysis of education, it is necessary to design the new teaching factors of talent as a whole. It constantly improves the students' experience and innovative quality to reduce the disconnection between social needs and university personnel training [11]. In particular, it strengthens the integration of professional education, innovation, and entrepreneurship. Also, it integrates the cultivation of students' innovative consciousness and thinking into the integrated learning and teaching together [10]. Innovation and entrepreneurship education should be incorporated into professional basic experimental courses to encourage students to develop entrepreneurship. It attaches importance to the combination of theory and practice and also to the cultivation of practical ability. College students are required to complete the assessment through project establishment and teamwork. In the entire assessment, the actual level of students should be considered in every aspect so as to stimulate students' innovative and entrepreneurial spirits [11]. The innovative education of electronic information in universities should consider the background of innovative education and thus reform the professional courses under its guidance. Following the objectives of previous curriculum syllabus development, the results of the students' learning effectiveness and engagement are investigated after adding competence-oriented instructional strategies into electrical engineering practical subjects [12]. Then, the teaching purpose is to cultivate students' self-study, innovation ability, and entrepreneurship [13] to optimize the teaching effect from the perspective of big data. The training mechanism of engineering education and innovation talent based on course-competition combinations is required on such occasions. In addition, the developmental and growth trajectories of students' educational expectations and learning performance reciprocally influence each other directly, and this contributes to their successful completion of the course [14]. Also, in teaching procedures, teachers should be more understanding and interact in a more student-centered way for better academic achievement [15]. Furthermore, the training mode of combining entrepreneurship and professional education also enhances the competitiveness of students and expands their employment path. Except for the correlation between teacher characteristics and teaching quality, effective methods are also important to identify key factors as they influence teaching quality. Here, a computational pedagogy research paradigm is proposed with quantitative models to quantify the characteristics of teaching quality [16]. It indicates the key properties of teachers and courses to influence their teaching quality. Curriculum sequencing is also a challenging task in the process of online teaching and learning system development. Adaptive curriculum sequencing is thus important in education management to find the optimal sequence of a curriculum as a typical NP-hard combinatorial optimization problem. A novel meta-heuristic algorithm, the group-theoretic particle swarm optimization method, is used to tackle the problem for better practical education plans and implementation [17]. Assessments are an important and powerful method to evaluate students' educational experience and academic abilities. Many education assessments, other than traditional exams, that use alternate methods require appropriate rationale and justification. Then, the data-driven decision-making method can be an innovative process for assessment methods and transformations [18]. So, education assessments other than traditional exams can be adopted in the evaluation of practical innovation education reform, such as electronic and mathematical competitions, social specialty practice, and so on. Finally, integrated collaborative education regarding specialty and entrepreneurship provides suggestions for novel EI-IPTR in application-oriented universities [19].

Currently, AI technologies are being developed to provide optimal solutions in many fields, including education. Significant transformations are brought about by artificial intelligence-supported (AI-supported) reforms in the education sectors of China and the United States of America (USA) [20]. Various elements of education, such as personalized learning, adaptive instruction, data analytics, and intelligent tutoring systems within the framework of AI integration, are thoroughly explored. As a typical AI technique, the recurrent neural network (RNN) model can be used for high-speed train vibration prediction from time series, but it has a long-term dependence problem [21]. To combat this problem, the long short-term memory (LSTM), a special RNN model, is designed to solve it [22]. The LSTM is further developed as the bidirectional LSTM, where the past and future contexts of the input elements are captured by processing the forward and backward sequential data with two independent LSTM networks [23,24]. LSTM-based AI techniques can also be used to analyze and predict the education reform. In addition, deep learning AI techniques of convolutional neural networks [25] and reinforcement learning [26] can also be used as the key techniques to improve the quality of teaching reform. Furthermore, China has embarked on a series of experiments with innovative technologies to improve the quality of education [27]. The latest development of computational technologies, including data analytics and machine learning, has been used to generate considerable hype and expectation for the significant transformation of education through AI technology.

To both learn from the above advantages and avoid weaknesses in current electronic information innovation practice, the proposed EI-IPTR carries out the multi-mode EI-IPTR program under the big data of education through the multi-mode, multi-level, and open reform of practice courses. It stimulates students' innovative consciousness and enterprising spirit, thus cultivating their professional, comprehensive, innovative talent quality. Finally, it is necessary to make it more suitable for the needs of enterprises. Thus, it has a comprehensive acquisition and application of professional practical knowledge to achieve a higher level of use of professional knowledge. Furthermore, it also achieves the ability of innovation and entrepreneurship, and it adopts the latest big data analysis to achieve a much better practical teaching reform effect. In summary, this paper mainly investigates the experimental study, field study, secondary data analysis, case study, and so on in the practical education reform for the major of electronics and information. Finally, the main measures for the electronic information teaching reform are briefly concluded as follows.

- Teaching construction of a series of integrated platforms with open modules to closely cover professional knowledge.
  First, the teaching reform integrates the basic practice courses. Then, it highlights the electronic circuit foundation and signal system under the big data analyses. Finally, it also strengthens electronic automation and other integrated platform course series. So, it sets up a new professional training system. It also establishes an integrated platform plus an open module teaching series to closely cover all required professional knowledge.
- AI-enabled big data management for a key combination of comprehensive and innovative personnel cultivation and training.
  The teaching reform deepens professional practice reform and focuses on exemplary leadership in the cultivation of top-notch innovative talents. Then, it also establishes an innovation mechanism to create and realize a practical training plan. Thus, it completes the AI-enabled big data management of the comprehensive and innovative personnel cultivation. Finally, it is performed with innovative credits and other performance evaluation methods.

- Construction of multi-module practical teaching to promote college students' professional, innovative learning ability and literacy.
  On the basis of the above AI-enabled big data analysis of practical education, a multi-mode practical teaching system is constructed. It is combined with the Excellent Engineer Program to cultivate innovative talents. Subsequently, the high-level application-oriented undergraduate practical teaching reform is also carried out to fully promote the high-quality cultivation of college students' professional, innovative learning ability and literacy.
- Practical effect evaluation and management for innovation-oriented electronic information practice training using decision-making teaching reform.
  Practical effect evaluation and management are also important in innovation-oriented electronic information practice training. The decision-making teaching reform under the AI-enabled big data analysis of comprehensive education, it uses the excellent training method of practical talents, and thus it organizes various practical teaching and management organizations well. Therefore, it unifies and coordinates all various practical activities for better practical education reform.

The rest of the paper is organized as follows. Section 2 introduces the problems in the practical teaching of electronic information. Section 3 discusses the ideas about the innovative multi-mode EI-IPTR scheme. Section 4 provides an analysis of innovative multi-mode EI-IPTR. Section 5 provides the AI-enabled teaching reform program for the EI-IPTR scheme. Section 6 exhibits the results and analysis of the proposed practical teaching reform to validate the good performance of the proposed scheme. Finally, Section 7 concludes the entire paper.

## 2. Problems in the Practice Teaching of Electronic Information

In the field of electronic information practice teaching, the improvement of students' comprehensive innovation quality and ability has always been the focus of practice teaching reform. On the basis of joint innovation of basic theory, curriculum experiment and professional practice, it is also necessary to take into account the multi-mode, multi-level and open training mode of innovative talents with big data. Therefore, on the basis of professional skills training, it is also necessary to meet the needs of enterprises. Then, they can be trained to be innovative and open professionals with high professional quality. Therefore, some key problems affecting the cultivation of students' practical and innovative abilities are listed as specific teaching reform problems as follows.

- Theory and practice of innovative education are out of touch, and the comprehensive practical teaching platform, such as the discipline and curriculum system, is not integrated.
  Influenced by the traditional concept of running a school, the training of students majoring in electronic information often has the contradiction that graduates find it difficult to find jobs, and enterprises cannot find satisfactory professionals. In innovation and entrepreneurship education, there are problems of disconnection between theory and practice and the mismatch between the students' abilities and enterprises' requirements. Therefore, limited by the lack of professional knowledge, teachers can not keep up with the latest professional development trend, resulting in students' narrow vision and inability to quickly adapt to the latest development direction of the subject.
- Innovative education resources are scarce, management is backward, and theoretical and experimental teaching is boring, which cannot fully inspire the enthusiasm of students.
  The engineering practice and innovation ability of college students are rather weak. The multi-platform and multi-level practice teaching system is not perfect. The in-class experimental teaching mode is single. Modern advanced teaching resources are scarce and difficult to integrate without high-tech electronics. For example, as the basis of electronic information practice, the computer principle experiment is far away from

the connotation of professional practical education. Then, it gradually transforms into a software training course, resulting in rigid and cumbersome experimental content. However, traditional experimental teaching often lacks the cultivation of students' comprehensive practical ability, especially the cultivation of students' comprehensive experimental design and analysis ability. For this reason, students only complete certain course experiments in the experimental course. As a result, they lack the understanding of the whole experimental system and the ability to conduct comprehensive experimental design.

- The incomplete curriculum system of innovation and entrepreneurship leads to the disconnection between professional theory teaching, experimental teaching, social practice, and the requirements of enterprises.
  The coherence of the curriculum of innovative majors is poor, and there is no unified system, which results in students' vague learning objectives and poor enthusiasm. There are few experimental relationships in some professional courses, which are not vivid enough or are difficult for the students to understand. Moreover, the curriculum system of innovative education is not perfect, and there are fewer teachers who actively participate in its guidance. This leads to a more serious lack of professional practical training and successful project experience. In addition, the assessment criteria of professional practical education are too loose, which makes more students with self-consciousness muddle through and be unable to concentrate on their studies. In addition, traditional practice teaching also adopts assessment methods to emphasize theory and neglect practice, which makes the students lack subjective creative consciousness and the level of analyzing and solving problems required.

## 3. Innovative Multi-Mode Electronic Information Practice Teaching Reform Strategies

The direction of teaching reform adheres to the combination of theory and practice; in particular, it highlights the support of practice to theory. It explores and elaborates the theory contained in practice from the existing problems in practice. Based on the discipline platform curriculum, followed by the principles of combining practical teaching with scientific research. It combines theory with practice, knowledge accumulation with ability training, discipline construction with personnel training and in- and out-of-class education, and high-quality talents with personalized training, respectively. Then, the training mode for top-notch innovative talents is designed. It aims at cultivating students' innovative abilities. It designs the training mechanism of practical innovation, expands students' professional horizons, and improves the level of innovative practice. In addition, it is necessary to establish and implement new practical and innovative training methods to further expand and train students' practical and innovative level. Therefore, we absorb the beneficial achievements of innovative talent training at home and abroad. Then, the practical teaching reform mode of innovation-oriented electronic information professional talents training is explored in compound innovation and multi-level open talents training. Finally, the research ideas for educational reform exploration are listed below.

In experimental theory, the effective ways to cultivate top-notch innovative electronic information talents are analyzed and discussed using the concept of higher practical education and the comprehensive optimization results of educational big data. The advantages and characteristics of such talents are analyzed. The connotation of their cultivation is also analyzed, and the specific training programs for innovative talents are discussed. Therefore, it jointly cultivates top-notch innovative talents in electronic information for the requirement of social and economic development.

In practice and exploration, the principle of educational big data analysis is used to apply the theoretical achievements of successful educational reform to the concrete implementation of experimental practice. It is also used to repeatedly practice and verify the effect of the educational reform theory to improve the whole process theoretically. It plays a leading role in educational reform. Even some of the excellent practical education cases and achievements are applied in colleges and universities to withstand the further test of practice.

In the specific implementation process, it also needs to follow overall deployment and layering to gradually promote the effectiveness of practical teaching reform under the analysis of big data. In overall planning and deployment, the core of the training system is determined for top-notch innovative students in electronic information through a comprehensive and overall practical teaching plan, just as its component modules. In segmented and layered implementation, aiming at the overall and component modules of the training system of top-notch innovative electronic information talents, it carries out systematic improvement in classification and segmentation. It actively cultivates innovative and practical abilities after students understand basic professional concepts; thus, it gradually promotes the beneficial achievements of teaching reform.

By gradually developing and promoting, the results are transformed into a new platform for the training system of top-notch innovative talents in the field of electronic information, and it constantly feeds back, adjusts, and improves during the process of implementation.

Therefore, in the early stage of teaching reform exploration, through investigating the current situation of electronic information teaching and students' learning, collecting data, and analyzing the big data of education, general teaching reform exploration is formulated. Then, the achievements of teaching reform exploration are summarized and sorted out midterm. Finally, big data verification and feedback iteration correction in practical teaching are carried out to comprehensively adjust the results of practical teaching reform.

## 4. Exploration of Innovative Multi-Mode EI-IPTR

Practical teaching reform is based on the collaborative innovation-oriented practical teaching of big data in education, aiming at improving students' innovative ability. It establishes an innovative practice system, expands students' professional scope, and improves their comprehensive, innovative quality. Simultaneously, innovative and practical training programs are created for students to exercise their practical ability. In addition, on the basis of referring to the excellent training mechanism of innovative talents at home and abroad, the big data analysis and exploration of the multi-mode, multi-level, and open training of modern electronic information talents oriented by collaborative innovation is also carried out. The teaching reform is mainly based on the analysis of educational big data, such as practical teaching objects and contents. It constructs a new innovation-oriented multi-mode electronic information practice system according to the following methods. In the implementation of teaching reform, the general direction of collaborative innovation is also considered, and it is combined with the following key points of practical teaching reform exploration and specific implementation methods. The form "practice → feedback → improvement → re-practice → ..." is performed in a circle. Spiral practice of personnel training mechanism is also used to improve the effect of teaching reform. Finally, the implementation of teaching reform is shown in Figure 1.

In Figure 1, the objects and contents of multi-mode innovative practice teaching under educational big data mainly include an integrated experimental platform, innovative talent training, multi-mode practice teaching, big data analysis, and the implementation of segmented multi-mode practice education. Among them, the integrated experimental platform includes the unified design of basic electrical and electronic experiments and some other professional basic experiments. It also involves the development of an integrated design module for the experimental course group, the integration of multi-mode and three-dimensional electronic information practice teaching, and the improvement of the integrated teaching methods. The innovative talent training module involves creating high-quality experimental talent training courses, promoting the reform of practical experimental content, and improving the application of electronic information practical education technology. The multi-mode teaching module needs to solve practice methods such as building an innovative practice teaching center platform, strengthening the experimental practice oriented by professional thematic cases, and building an enterprise practice base for social needs. Finally, the construction of a multi-mode practical education system includes innovation competitions of electronic information applications, such as the College Students' Challenge Cup, Electronic Design Intelligent Vehicle, Freescale (Enterprise Funding Category), and scientific research projects of Local College Students' Innovation and Entrepreneurship Program, as well as strengthening top-notch innovation in accordance with the requirements of people-oriented and individualized teaching. It strives to build an incentive mechanism for personnel training.

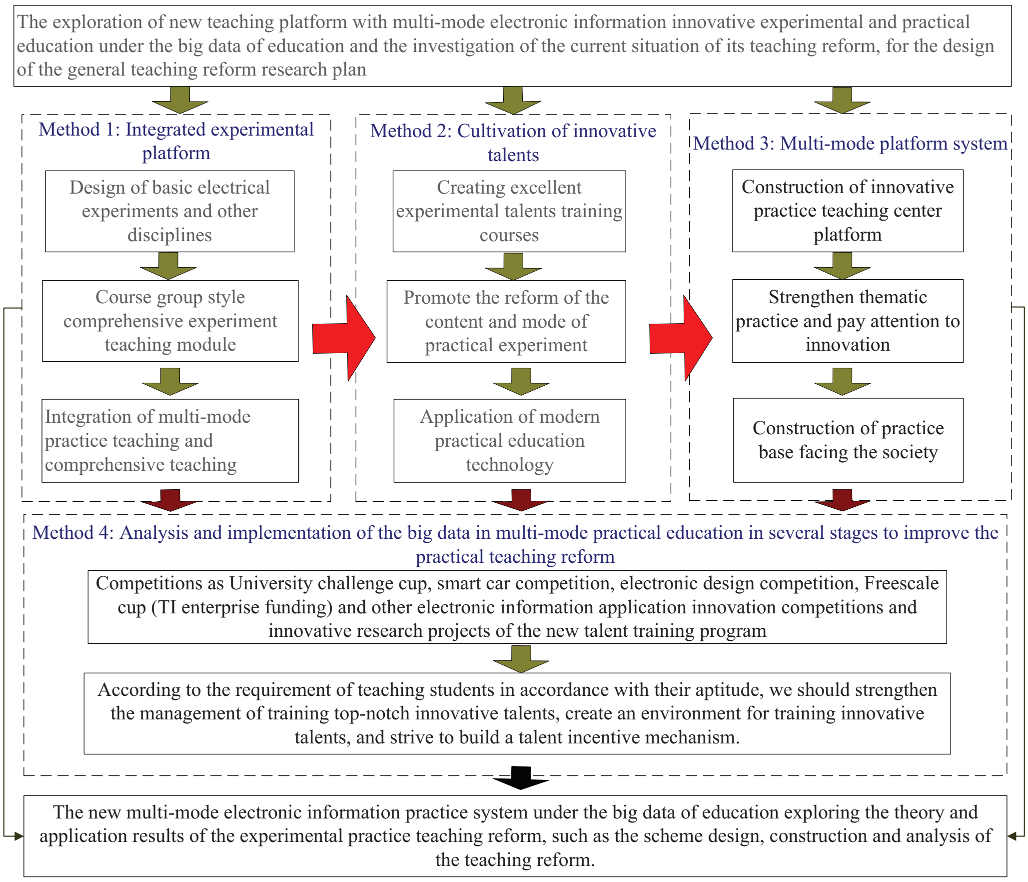


**Figure 1.** Educational big data analysis and exploration of multi-mode electronic information innovation practice teaching.

In addition, according to electronic information innovation practice teaching under the above educational big data, we can also construct a new system of innovative practice personnel training according to the following four specific implementation methods.

(1) Integrate basic practice courses and highlight the electronic circuit foundation and signal system under big data analysis, electronic automation, and other integrated platform course series to set up a new professional training system. Then, an integrated platform with and open module is established, closely covering professional knowledge.

Through the professional teaching reform of "integration, reduction, improvement, and division", the curriculum system of practical education has carried out the key curriculum setting of major disciplines and specialties. It establishes key professional practical courses and carries out in-depth exploration of simple and understandable basic application teaching and self-designed experimental teaching. Especially in view of the better advantages of teachers' teams in scientific research, the achievements of the scientific research stage, especially typical innovative engineering cases, are taken as the typical examples of students' innovative discussion. So, it includes the latest development trends in information technology, cultivates students' interest in learning, and lays a good professional foundation. Simultaneously, an innovative case of the practice of teaching reform is carried out, too. They enlighten the significance, including practical engineering materials and open exploration content, to promote students' active exploration and ability improvement.

Simultaneously, the practical teaching method of a curriculum system group based on modular curriculum is established, and the principle of educational big data analysis and the relationship and promotion of various parts are adopted to realize the demand for flexible learning of professional knowledge. For example, in courses with electronic information specialty, the old individual teaching forms of the circuit principle, electronic circuit, and microprocessor courses are broken, and the above electronic practice teaching is integrated into a complete electronic information basic practice course. Moreover, teachers and students interact together to discuss practical cases, form a good teaching atmosphere, and complete the comprehensive evaluation of innovative, practical cases. On the basis of discussion and analysis of these teaching cases, it is also necessary to summarize and promote the innovative practice of teaching in different specialties. In addition, the social demand for talent is combined with the solution of real technical problems faced by enterprises in practical teaching. It also combines the above case study of training, and it guides students to apply what they have learned to solve specific professional and technical problems; thus, it improves their practical ability. Moreover, students are recommended to practice directly in electronic information enterprises and institutions. They are not only to participate in research and development but also to focus on the cultivation of innovative consciousness in technology, economy, and management.

(2) The reform of professional practice education should be deepened and given full play to the leading role in the cultivation of top-notch innovative talents. It establishes the innovative mechanism and creates and realizes a practical training plan. It also completes the big data management mechanism of key links of comprehensive, innovative personnel training by means of innovative credits and other performance evaluation methods.

It makes every effort to design experimental and practical courses and takes this as a guide to strengthen the construction of excellent courses with professional characteristics. It can consolidate and deepen the advantages of disciplines and specialties and strengthen the planning and construction of the curriculum system. In addition, it strives to create a number of high-quality courses, such as excellent national and provincial courses, on the basis of the original practical courses and the analysis of big data for practical education. Specifically, by the establishment of innovative practice courses in students' practice teaching, the schemes of multi-mode, multi-level and open innovative practice topics are set up. After that, it carries out electronic information software and hardware verification experiments and summarizes feedback to improve students' practical ability.

Meanwhile, the reform of the form and content of practical teaching should be promoted. It improves the training effect of existing top-notch innovative talents. Specifically, through the characteristics of each student's own characteristics and interest direction, a practical training plan suitable for their own development can be customized. In particular, personalized training programs are customized for the best students, and special practical training scenarios are introduced to teach students in accordance with their aptitude and improve their innovation level. For example, in the teaching plan of top-notch practice and innovation training, classic world-popular textbooks are introduced to carry out direct foreign language teaching, and practical exploration teaching, such as discussion and inspiration, case analysis, and so on, is used. Moreover, through specially designed scientific research training practice, students can enter the teachers' scientific research group as soon as possible. It introduces more and earlier scientific research and social practice into the teaching content to explore new forms of innovation and entrepreneurship practices, such as sand table deduction of college students' scientific research training. In addition, some basic experimental courses of electronic information specialty can be carried out in English, focusing on the introduction of the case-oriented mode of famous universities at home and abroad, with open, multi-layer, and multi-mode practical topics as the content, to guide students to actively use the latest network resources, find the latest frontier professional knowledge, and seek solutions to problems. The implementation of all-English practical teaching reform greatly enhances the level of access to advanced professional information, and it better meets the development needs of tracking and even surpassing the international frontier technology. Simultaneously, it also helps students understand the frontier trends and development of their major, grasp the prospects of their professional development, and lay a good foundation for participating in international academic exchanges and scientific and technological competitions in the future. That is, students can better track and verify the latest electronic information technology to be guided to explore and improve their innovative ability.

Modern big data Internet information technology has been adopted to reform teaching methods and strengthen the application of modern information-based education methods. In practice teaching, we also need to face the new generation of "Internet +" innovation practice. First of all, network multimedia resources and teaching materials are made full use to guide students to participate in innovative learning in practice. This teaching reform exploration also actively uses the school's existing network classroom and other practical teaching website resources to improve the effect of simulated innovative, practical learning. Through the school practice teaching website for online resources, such as online teaching classrooms and discussions among teachers and students, students can learn and improve after class. Among them, "Network Teaching School" includes all kinds of electronic resources in the practical experiment course, such as practical course plans, multimedia demonstration cases, experimental self-test guidance, teacher–student Q and A communications, open thematic discussions, etc., which are very helpful for students to accumulate comprehensive professional knowledge.

(3) On the basis of big data analysis of practical education, a multi-mode practical teaching system is constructed, combined with the Excellent Engineer Program to cultivate innovative talents, and the high-level application-oriented undergraduate practical teaching reform is carried out to fully promote the high-quality cultivation of college students' professional, innovative learning ability and literacy.

After establishing the platform of electronic information specialty, to optimize and adjust the composition of students' professional knowledge, we closely combine the teaching theory and practical training relationship under the big data of education. Therefore, it is necessary to establish a practical experimental teaching system consisting of experimental innovation teaching, thematic design practice, extracurricular competition and training base construction, social enterprise practice, and other modules. Thus, it is possible to implement the training purpose of top-notch innovative talents with electronic information characteristics. Therefore, it is urgent to reform the traditional curriculum system of experimental practice, which is only attached to theoretical teaching, and to improve experimental practice teaching to the same level as theoretical teaching. In addition, it is necessary to adjust the laboratory structure and optimize the allocation of practical resources. It also builds a comprehensive practical training platform for students' experiments and competitions using new practical teaching. The key to implementing this innovative scheme is to establish a collaborative teaching reform model based on the big data of joint theory and practical education. For example, we make full use of the experimental teaching centers of electrical, electronic, and electronic information at the school and college levels and establish basic practice facilities such as relatively perfect experimental instruments and equipment sites. In the specific implementation, it is also necessary to encourage students to participate in professional practice activities such as scientific research, electronic competitions, and innovation and entrepreneurship to better apply the school's professional characteristics resources and encourage outstanding undergraduates to directly participate in the research of innovation and entrepreneurship projects. Students can indirectly experience professional practice by organizing them to listen to expert reports and visit the results of college students' competitions, simulating their interest in learning and allowing them to devote themselves to professional practice. For example, through the practice of counseling students to participate in the Challenge Cup, electronic competitions, and new young-talent entrepreneurship competitions, we can cultivate and improve their innovative and practical abilities. Therefore, students become innovative and open compound talents who can withstand the challenges of practice.

(4) Practice effect evaluation and management are also the key to innovation-oriented electronic information practice training mode. Through the decision-making and teaching reform mechanism under the analysis of big data of comprehensive education, it uses the best training method for practical talents, organizes various practical teaching and management organizations, and unifies and coordinates various practical activities.

Teaching reform also needs to establish a multi-mode practical education system designed in stages on the basis of the optimization of the practical training mode after the analysis of big data in education. In the stage of practical education, the achievements of teaching reform should be transformed into key case resources of practical experimental teaching as soon as possible. Undergraduates should be allowed to participate in high-level competition experiments and scientific research projects. Project- and case-oriented research and exploration of practical teaching methods should be implemented in the form of creating a training system for top-notch, innovative, and multi-mode talents. Therefore, it is necessary to adopt the training mode of excellent innovative talents by selecting and training excellent students. It optimizes the results of teaching reform after the analysis of big data of practical education to realize the comprehensive, multi-mode practical education system of the electronic information specialty.

In addition, it is necessary to optimize the results by combining key factors, such as the management of big data analysis of education. It improves the rules and regulations of practical teaching management and creates better incubation conditions for the cultivation of innovative talents. According to the principle of teaching students in accordance with their aptitude, we should strengthen the standardized management of the cultivation of innovative and top-notch talents. Meanwhile, we should construct a talent training environment and establish an incentive mechanism for top-notch innovative talents. Moreover, the evaluation of teaching reform is also an effective means to improve the quality of teaching, affecting its effectiveness and efficiency. In the specific implementation of the teaching reform, in addition to considering the diversification of students' quality and the factors of teaching students in accordance with their aptitude, we also need to reflect, evaluate, and improve the effectiveness of teaching reform to check leaks and fill vacancies. Otherwise, it has adverse effects on the practice of teaching reform. In addition, it is necessary to adopt the system analysis method to carry out a comprehensive analysis of the ideas and methods in the evaluation of practical teaching reform, forming a self-correcting closed structure to ensure the effectiveness of the quality evaluation of practical teaching reform. Specifically, by formulating evaluation objectives of teaching reform and comparing practice effect benchmarks, the method collects and feeds back the results of teaching reform. It also compares and analyzes the gap between the effectiveness of teaching reform and the project objectives. Therefore, it corrects the wrong countermeasures of practicing teaching reform and obtains the evaluation and management requirements.

Finally, through the analysis of educational big data, this topic intends to optimize the allocation of big data in the above four levels of the experimental practice curriculum system. It explores the big data mode of application-oriented electronic information undergraduate practice teaching reform in four aspects to carry out an in-depth exploration of the training mode of practical innovative talents. In particular, the results of evaluation and management practice make the exploration and implementation of teaching reform under the big data of education achieve better collaborative innovation, open application, optimized professional and management integration of compound electronic information professionals.

## 5. An AI-Enabled Electronic Information Teaching Reform Program

Through collaborative innovation-oriented, practical course teaching, a practical teaching reform system with an AI education specialty is built. Teaching reform is divided into basic, advanced, and comprehensive promotion reforms for students. The whole process is gradual, scientific, and comprehensive in order to improve the overall quality of students. The process involves the AI deep learning technique to improve ideas, reinforcement learning countermeasures, and data visualization technology. Through the rational use of the above AI technique, the reform of traditional teaching models can be improved. According to the above scheme, a new system of staged artificial intelligence experiments oriented to improve students' comprehensive quality can be devised. Teachers use AI technology to deeply analyze experiences and put forward pertinent suggestions to students. On the basis of AI improvement strategy, students carry out innovative practice training proposed by teachers and complete the relevant improvement practice content and innovation summary feedback to the teacher's evaluation summary. Then, the teacher will carry out a strategy analysis and make improvements to achieve a spiral rise. The content reviewed by teachers further improves the intelligence of the whole teaching system; thus, it forms a virtuous circle of AI teaching.

### *5.1. Teaching Improvement of Electronic Information Basic Theory and a Practice Course Based on Deep Learning Strategy*

Deep learning is a complex machine learning algorithm that has achieved far more results in speech and image recognition than previous related technologies. It has made great achievements in search technology, data mining, machine learning, multimedia learning, speech, recommendation and personalization, and other related fields. There are many application scenarios in basic teaching combined with deep learning-related technologies, such as recommendation of teaching resources, intelligent diagnosis of learning disabilities, course assistance and answering questions, and the use of intelligent subject tools. Aiming at the problem of learning difficulties in basic courses of electronic information specialty, it can intelligently recommend high-quality curriculum resources such as basic mathematics and signal and embedded programming through students' wrong questions. The learning obstacles caused by the lack of basic knowledge of students with poor foundations can also be intelligently diagnosed by building the logical structure relationship between knowledge in the field. Using the deep learning model, the intelligent learning support system can construct a logical structure relationship at the knowledge level and the obstacle dependence relationship between different knowledge points to accurately judge the causes of each student's weak knowledge points. Due to the lack of offline contact time with teachers, problems that are difficult to solve in a timely manner can also be solved using in-depth learning technology to collect data on students' knowledge mastery status, which generates prediction reports for teachers to review. Then, teachers can solve questions online and formulate the next teaching plan. In addition, the in-depth learning of computer vision and natural language processing technology also has corresponding application scenarios in teaching reform. For example, computer vision is used to help students identify the types of embedded components by image recognition and natural language processing technology combined with teacher evaluation is used to automatically generate the evaluation of a student's mastery of knowledge. All the above results based on the application of in-depth learning technology are further fed back to teachers so they can optimize the teaching plan. Finally, the application of deep learning in basic teaching is illustrated in Figure 2.

This method of teaching reform is oriented to improve the teaching mode of the electronic information specialty, combined with in-depth learning technology to improve the problems highlighted by the traditional teaching mode. Teachers can update the teaching plan in time according to the feedback results of the system so as to achieve the goal of teaching students in accordance with their aptitude.

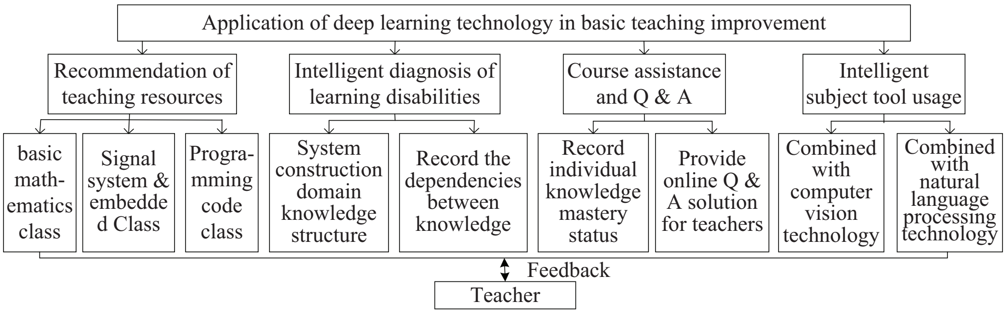


**Figure 2.** Application of deep learning technology in basic teaching.

## 5.2. Combining Reinforcement Learning to Improve the Advanced Competition Project

Reinforcement learning is an important component in the field of machine learning, aiming at how agents take different actions in the environment to maximize the cumulative reward. According to the new state and the reward of environmental feedback, the agent executes the new action according to a certain strategy. Through reinforcement learning, the agent can determine what kind of action the ontology should take in this state to get the optimal reward. In the teaching reform, the idea of strengthening learning is combined to build the exploration of antagonistic teaching reform. It is mainly used in advanced competitions, projects, and other targeted courses. Specifically, it can set up project competition and starlight defense simulation competition in the new seedling plan. Then, the scheme design competition is set up before the electronic design competition, and the programming competition is optimized after the competition. The school simulation modeling score competition and question type competition are also set up after the mathematical modeling competition. In this teaching reform, students build an intelligent competition confrontation system in groups, which records the progress of each member's competition project and scores the completion of each part to accumulate scores. In the follow-up competition process, the system compares the completion of each link between the two groups, and it provides improvement measures to urge each other to make continuous progress. In the process, the two groups set the observation state at each stage; the teacher sets the corresponding reward. Then, the teacher maximizes the reward function to optimize the teaching effect. Finally, the application of reinforcement learning in advanced teaching is shown in Figure 3.

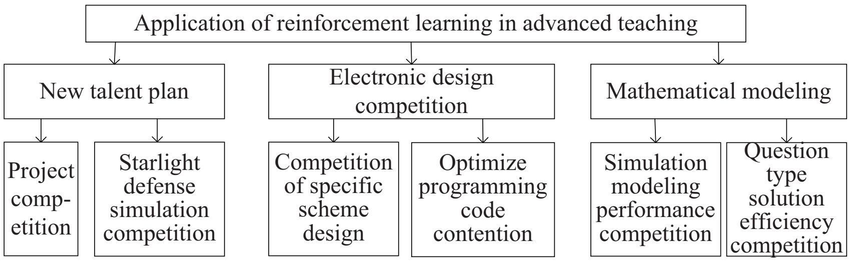


**Figure 3.** Application of reinforcement learning in advanced teaching.

This teaching reform is oriented to improve students' competition innovation ability. It is combined with the idea of strengthening learning to practice the teaching reform of the competition module in the traditional teaching mode. Teachers can reform the teaching through the problems shown by students in the entire process of practice combined with the actual specific courses.

## 5.3. Reasonable Use of Big Data Technology to Improve Students' Personal Quality and Practical Ability

Quality education refers to student-centered education, where students are the masters of their learning. In the process of implementing quality education, we should focus on cultivating students' awareness of autonomous learning and promote students to explore and think independently in teaching activities to achieve the best teaching effect. Big data technology is the extraction of the value of complex massive data, and the most valuable part is predictive analysis. It can help teachers to better understand the data through data visualization, statistical pattern recognition, data description, and other forms of data mining; thus, it makes predictive decisions according to the results of data mining. This teaching reform focuses on the use of big data technology to record students' performance in class and then performance and competition projects. It also uses big data technology to visualize for teachers to analyze. Teachers can teach students in accordance with their aptitude according to the different behaviors, achievements, and performances of different individual students. The whole process is then further fed back to the big data system. In this teaching reform, teachers should focus on the incentive effect of learning results and make full use of the feedback of learning results. In teaching, teachers put forward different requirements for students with objective differences through visual analysis of the results of different students, encourage students at different levels to succeed in learning, and let students experience the joy of success. In particular, students with learning difficulties have a poor foundation, slow progress, and a strong sense of inferiority. Teachers should try their best to explore their shining points and help them build up self-confidence. Students are more willing to study independently, their personal qualities are further improved, and their practical abilities are enhanced. This teaching reform is oriented to improve students' personal quality and practical ability, combined with AI intelligent technology. It should be given appropriate scores and encouraged according to the innovative points of students with different learning abilities in the teacher project assessment. So, it can achieve the ideal effect of practical teaching reform. Finally, the application of joint deep learning and big data technology in visualizing students' individual data is shown in Figure 4.

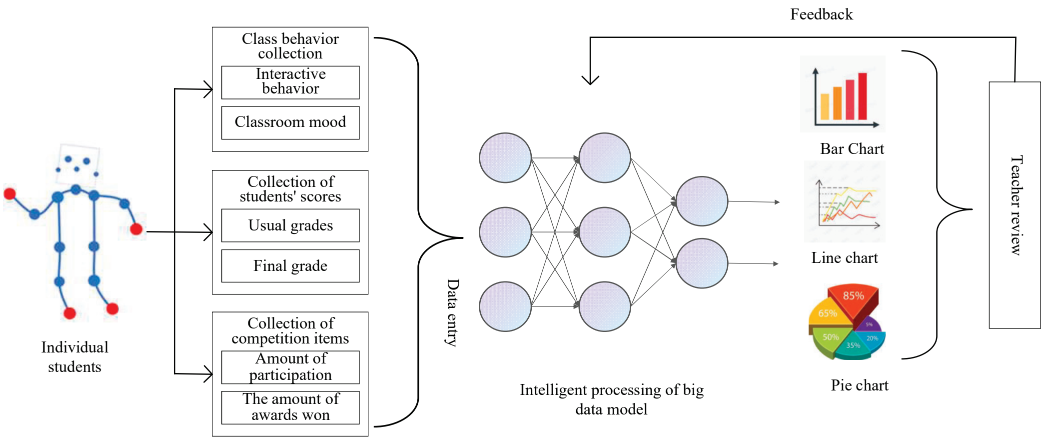


**Figure 4.** Application of joint deep learning and big data technology in visualizing student individual data.

This teaching reform is guided by the individual data of students, and it is combined with intelligent data technology to analyze and interpret the collected data of students. Then, teachers improve different aspects of individual students according to the pertinence and concreteness of the data results, and they ultimately achieve the goal of improving their quality in an all-round way and increasing the teaching results significantly.

### *5.4. Practical Teaching Reform Model Examples and Practical Training Analysis*

Based on the practice teaching of deep, intelligent, collaborative, innovation-oriented education to improve students' innovative ability, mathematical modeling is performed by behavior and performance quantification. In the AI deep, intelligent, collaborative, innovation-oriented deep learning practice of teaching, recording and reasoning is used to predict students' innovative ability. The mathematical model is constructed by intelligent reasoning of behavior and performance quantification and hidden state extraction. To carry out multi-mode, multi-level, and open deep intensive antagonistic learning, small sample generalization analysis, exploration, and iterative feedback enhancement are utilized to assist the new engineering practice teaching decision-making of electronic information specialty. Based on the above ideas, it tries to use AI to model and train students and construct a student learning quality model according to the above ideas. The main contents are the individual student. The parameters include the award-winning situation of students participating in competitions, the usual performance of students, and the final performance of students.

The LSTM model is used to pre-process and transform student data. Drawing on the idea of AI, the intelligent prediction data process is applied to practical teaching reform. One-hot coding is used to code the individual data of students so that the data set competition awards can be divided according to their grades. The usual scores can be divided according to the score section, and the final scores are classified according to subjects. The specific implementation is set according to the actual needs. Through the LSTM network, combined with the attention mechanism (AM), the hidden state of the LSTM and all time steps of the input sequence are input into an attention model to calculate the attention weight of each time step. The calculated attention weight is added to the input sequence to obtain a weighted input vector, and it is input into the LSTM network to perform the next prediction. To correlate all the previous learning data, the model actively learns the network output state weights at different times after using the hard attention mechanism. It weights the previous data according to the weights as the network state input at the previous time. The model predicts the situation of individual students by learning a large amount of student data, and finally, teaches students according to their aptitude to more accurate positioning prediction results. Using this strategy, students' training programs and teaching content can be adaptively adjusted and changed. Furthermore, according to the students' usual performance of each subject, the teaching content of weak links helps students to consolidate learning. If online courses are not up to standard, it promptly reminds students to re-study and consolidate the content. Teachers can also judge students' innovative abilities according to the probability of winning prizes in competitions. Then, they encourage students to continue to participate in competitions. Therefore, according to the balance between the probability of winning a prize in the competition and the corresponding results, it is determined to change the teaching content to focus on the practical intensity of a course for students.

## 6. Results and Analysis of the Proposed EI-IPTR Scheme

In the process of implementing quality education, we focus on cultivating students' awareness of autonomous learning. We also encourage students to explore and think independently in teaching activities to achieve the best teaching effect. Teachers can teach students in accordance with their aptitude according to the different behaviors and achievements of different students. The whole process is further fed back to the big data system. In this teaching reform, teachers focus on the incentive effect of learning results and make full use of the feedback effect of learning results. Teachers put forward different requirements for students with objective differences by analyzing the quantitative prediction results of different students in teaching. This encourages students at different levels to make different choices in learning direction. Focusing on screening students with poor foundation and slow progress to choose basic teaching modules, they are trained for high comprehensive quality and strong innovation ability to choose competition improvement modules. This teaching reform program is oriented to teach students in accordance with their aptitude, combined with LSTM technology. Teachers provide different development plans according to students with different learning abilities, and they ultimately achieve the ideal effect of practical teaching reform.

Recurrent neural networks (RNNs) can deal with the sequence data of some relationships, but they have problems with gradient divergence and explosion. The LSTM solves the gradient divergence by changing the internal structure of the original RNN to avoid the divergence errors by backpropagation and the long-term dependence by deliberate improvement. In addition, using the attention mechanism, the limitation that the traditional encoder–decoder structure relies on an internal fixed-length vector during encoding and decoding can be accomplished. It is achieved by retaining the intermediate output of the LSTM encoder for the input sequence, then training a model to selectively learn these inputs and associating the output sequence with the model output. That is, the generation probability of each item in the output sequence depends on which items are selected in the input sequence. In the task of teaching achievement evaluation, using the attention mechanism model, every time an evaluation parameter is generated, the most relevant variable set is found in the input sequence. After that, the model jointly predicts the next target teaching performance parameter according to the current associated variables. All the previously generated parameters are thus optimized. Although the model uses the attention mechanism, it still increases the amount of calculation, but the performance level is improved. In addition, using the attention mechanism makes it easier to understand how the information in the input sequence affects the resulting sequence during the model output process. It helps to better understand the internal operation mechanism of the model, as well as the deep debugging of some specific input–output, which greatly improves the accuracy of prediction parameters. In the experimental simulations, except for the clear descriptions of the initial input data for the AI prediction model, there are just the numerical techniques in the experimental due to the extremely complex nature of the AI model itself. Thus, we just apply the proposed AI model mechanically with proper parameter improvement in the education reform experimental simulations. This process can be seen as a half-experience and half-scientific scheme, and our initial try to do some work for the science of the educational reform subject, which is usually experienced in social science. Finally, the process of combining the LSTM model and attention mechanism together to predict individual student data is as follows.

After collecting initial and individual students' data and attention-based pre-processing, the first step of the LSTM is to decide which student information to discard from the cell state, made by the S-shaped layer as the "forget gate layer". Then, output a number $h_{i-1}$ between cell state "0" and cell state "1" by the last cell state with output $x_i$. The current cell state inputs $C_{i-1}$, where "0" means getting rid of old historical data completely and "1" means keeping it completely. Its specific structure is shown in Figure 5.

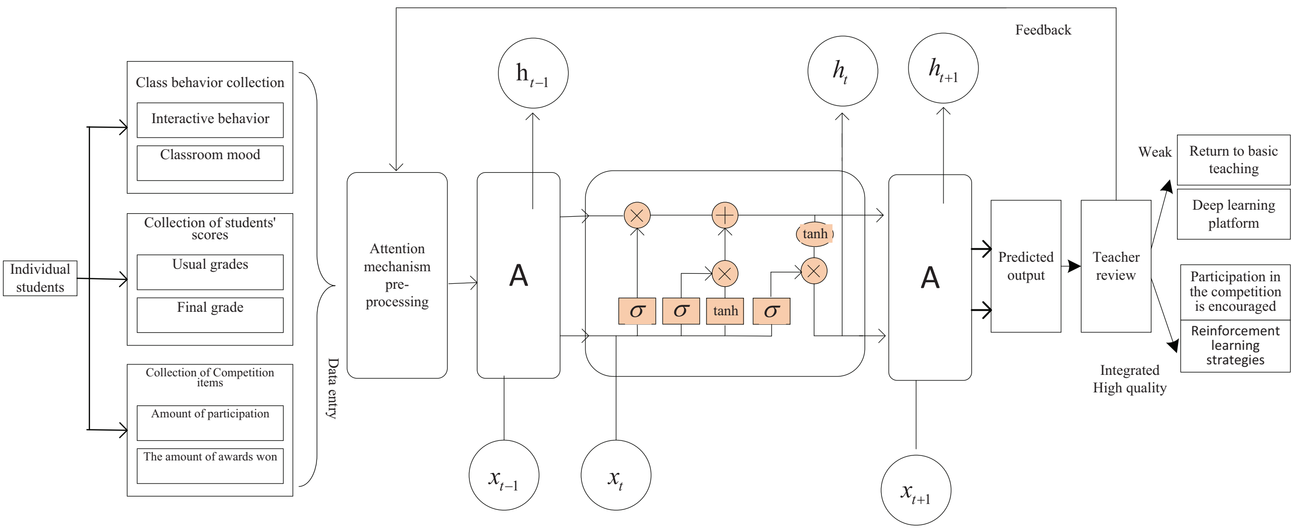


**Figure 5.** Application of the LSTM model to predict individual student data.

The LSTM model tries to forget the previous historical student information when the current cell state inputs the student information. Given the variable definition in the LSTM model [22], the process is quantified and illustrated as follows:

$$f_i = \sigma\left(W_f \cdot [h_{i-1}, x_i] + b_f\right). \quad (1)$$

Then, it determines the information stored in this student information unit and it is divided into two parts. First, the S-shaped layer called the input gate layer determines the values $i_t$ to be updated. Then, the "tanh" layer creates a new candidate value vector, $\tilde{C}_t$, which is added to the student information. It is quantified as follows:

$$i_t = \sigma\left(W_f \cdot [h_{i-1}, x_i] + b_f\right), \quad (2)$$

$$\tilde{C}_t = \tan\mathrm{h}(W_C \cdot [h_{i-1}, x_i] + b_C). \quad (3)$$

After that, it updates the old cell status $C_{t-1}$. The process depends on the new cell status $C_t$. Then, we multiply the historical student information state by $f_{t-1}$, forget the previously decided student information, and add $i_t * \tilde{C}_t$ as a new candidate value. Finally, it is quantified as follows:

$$C_i = f_i * C_{i-1} + i_c * \tilde{C}_t. \quad (4)$$

Finally, the decision was made to output the predicted student data, with the cell status already generated but with some information $o_t$ filtered out. First, a Sigmoid layer is generated to determine the state of the output cell. The student state information is then passed through the "tanh" function (pushing the values to "$-1$" and "1"), and it is then multiplied by the sigmoid gate output to get the final student data prediction output $h_i$. The process is quantified as follows:

$$o_t = \sigma(W_o \cdot [h_{i-1}, x_i] + b_o), \quad (5)$$

$$h_t = o_t * \tan\mathrm{h}(C_t) i_t * \tilde{C}_t. \quad (6)$$

According to the characteristics of students' individual training data, the attention mechanism (AM) is introduced into the LSTM model, and a neural network is added to each state output of the original LSTM model. The advantage is that it decodes outputs the historical data required for selection at each step, rather than the previous step. In the individual data of students, the LSTM model selectively relies on all the previous data records of students when predicting the output of student data rather than relying solely on the single data input in the previous step. Hence, it makes the prediction output more accurate.

Based on the above concepts of the LSTM technique with the assisted attention mechanism (AM), the students' individual model is made to predict the possible improvement of education reform. The LSTM training parameters for reform are adopted, followed by the students' individual data and the requirement of the student development model by the AM-aided LSTM. The input data for the training model are the quantification of the parameters, including the evaluation of student enthusiasm in class, the accumulated correct record of exercises and mid-term examinations, awards for participating in competitions, the objective evaluation/self-evaluation of student enthusiasm, and so on. Actually, we just use the AM-aided LSTM model to fit the data of practical education reform to predict and interfere with students' effect of learning for better performance. Furthermore, because it is our first try of the experienced or veteran method to place education data into a quantification AI model of the AM-aided LSTM, most of the input data are normalized for the proper treatment of the mathematical model to prevent the missing data or overflow problem, except for some individual data, such as the student's individual enthusiasm in class and so on mentioned in the context. The initial data for the model are raw data, such as the examination scores of students ranging from 1 to 100, and so on. The experimental results are also normalized as the evaluation standard for the students' grade prediction and accuracy prediction. All the data on educational manifestations are collected using objective examination scores and the subjective evaluation of enthusiasm. Then, the main body is the individual student, and the parameters include the evaluation of student enthusiasm in class, the correct record of exercises and the award of participating in competitions. The LSTM model is used to preprocess and transform the student data. Drawing on the idea of AI, the process of intelligent prediction of data is applied to the practice of teaching reform. One-hot coding is used to code the individual data of students. The data set sets up the record of students' enthusiasm evaluation and scoring in class. It also sets the record of students' correct exercises and the record of students' winning prizes in competitions. The LSTM hidden state and all time steps of the input sequence are input into an attention model by combining the LSTM network with the AM to calculate the attention weight of each time step. Then, the calculated attention weight is added to the input sequence to obtain a weighted input vector, which is input into the LSTM network to perform the next prediction. The model predicts the situation of individual students by learning a large amount of student data, and finally, it teaches students according to their aptitude with the more accurate positioning prediction results. Using this strategy, students' training programs and teaching content can be adaptively adjusted and changed.

The teacher evaluates the student's individual enthusiasm in class with a score of $U_t$, $U_t \in \{0,1\}$, which indicates the student's classroom enthusiasm in month $t$. $S_t = \{a_t, b_t\}$ indicates that a student's answer to exercise $a_t$ in month $t$ is $b_t$, where $a_t \in \{1, \cdots, N\}, b_t \in \{0,1\}$. For example, $S_t = \{2,1\}$ means that the student answered Exercise 2 correctly in month $t$. Correspondingly, $S_t = \{2,0\}$ means that the student answered Exercise 2 incorrectly in month $t$. $W_t = \{c_t, d_t\}$ represents the number of competitions the student participated in and the number of awards the student won in the month $t$. In summary, the individual model for students is defined as follows:

$$l_t = \{U_t, S_t, W_t\}, t \in \{1, 2, \cdots, 10\}. \quad (7)$$

Input the summary training data parameter: $l_1 = \{0.7, 14, 18, 16, 17, 1, 2, 1, 3, 2, 1\}$, $l_2 = \{0.6, 9, 10, 12, 10, 0, 2, 1, 2, 1, 0\}$. This indicates that the student's classroom enthusiasm evaluation in the first month is 0.7 with some data collected from the experiment. The training parameters are set to train the model step by step. The weight is initialized randomly in the interval of [−0.06, 0.06], and the small weight value can avoid the oversaturation of the Sigmoid interval. The initial learning rate is set to 0.04, and the Adagrad optimization is used. The algorithm constrains the change of learning rate to avoid excessive learning rate, and the number of hidden nodes in the LSTM network is set to 180.

Teachers of each subject evaluate and score students according to their classroom enthusiasm. They also collect data and divide them according to months to make a scoring data set of individual students' class enthusiasm. Then, a large number of students' class enthusiasm data is input into the LSTM model with the best effect after training and analysis. During the training, the discarding part of the historical student's positive degree information is defined as $f_t$ in Equation (1). The predicted student's positive degree quantization $i_t$ and the history student's positive degree information update $\tilde{C}_t$ are updated according to Equations (2) and (3). The historical student positive degree is updated according to Equation (4). In Equations (5) and (6), the information $o_t$ of the student's class progress degree with a low correlation degree is discarded, and the final result $h_t$ of the progress degree prediction is obtained.

Based on the prediction and analysis of the individual student's class enthusiasm in the courses of the electronic circuit, signal and system, and digital signal processing of electronic information major, the broken line chart of the student's class enthusiasm evaluation score and the prediction effect is shown in Figure 6. The general trend of the student's predicted enthusiasm score is a little close to that of the teacher's real enthusiasm score.

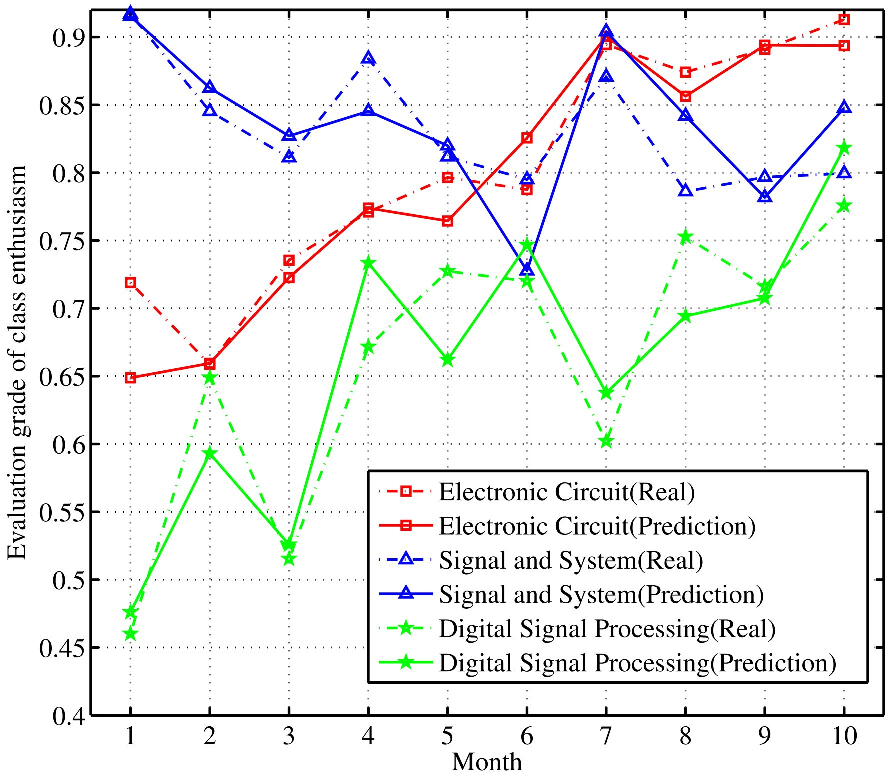


**Figure 6.** Student class progression grade prediction chart.

In Figure 6, the student performed well in the course on electronic circuits, but the score of the course decreased significantly in month 2. In the course of digital signal processing, there is a low level of enthusiasm, especially in the early stage of the course. It is of little significance to predict the positive performance of the course for a short time in practical applications. Teachers refer to the positive performance of individual students in the past two months, and it provides specific countermeasures for students with poor performance in specific courses. In this experiment, we only use the numerical techniques in the experimental simulations due to the nature of the complex AI model itself, which is very hard to analyze using the feedback and iterative mechanism. Just by the nature of the convergence of the proposed AM-aided LSTM model, the student class progression and grade prediction of the proposed prediction scheme exhibits good performance, and it approaches that of the real one.

Figure 7 is a plot of the training and prediction accuracy of the course exercises. The prediction accuracy of the trained model in electronic circuits, signals, and systems, and digital signal processing exercises are stabilized at more than 80%. The deep learning course recommendation platform obtains students' individual course knowledge weaknesses according to the prediction curve to recommend relevant knowledge learning courses to students. Teachers can also count group data to improve the proportion of specific course knowledge. In this experiment, we just adopt the numerical techniques in the experimental simulations due to the nature of the complex AI model itself, which is very hard to analyze using the feedback and iterative mechanism. Just by the nature of the convergence of the proposed AM-aided LSTM model, the accuracy of the proposed prediction scheme exhibits good performance to approach that of the real training one.

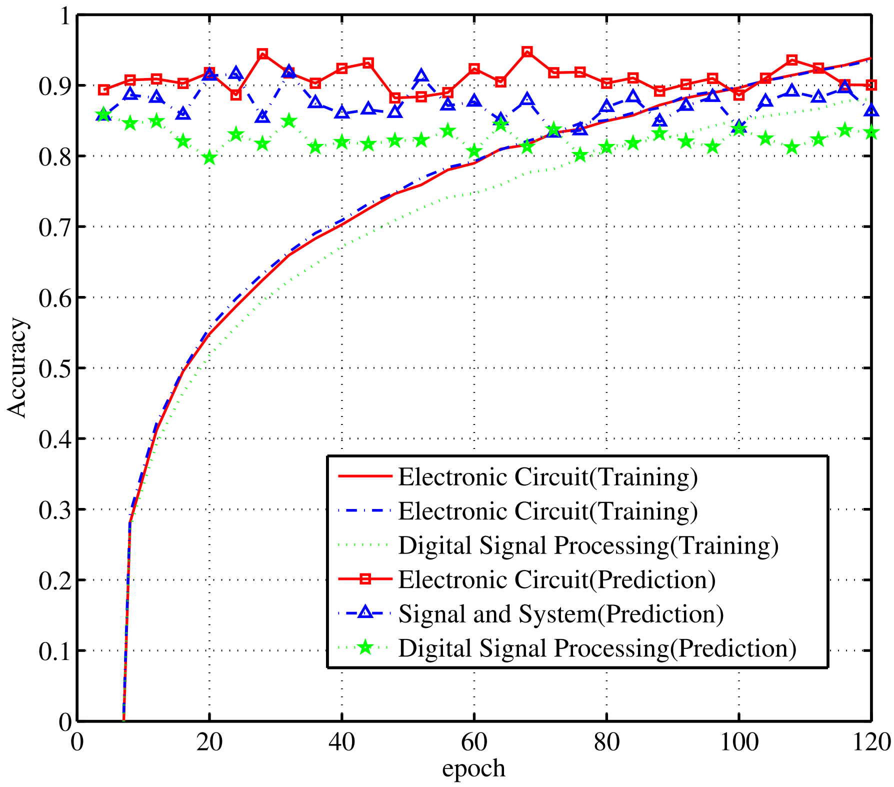


**Figure 7.** Curves of course exercise training and prediction accuracy.

Combined with the correct situation of students' usual exercises and the award-winning situation of participating in competitions, it can roughly predict students' future performance in competitions. Due to the small number of competition participants, it is necessary to count a large number of student data to make a data set for the specific training of the model. In training, the discarded part of the historical student competition information is defined as $f_t$ in Equation (1), the predicted student competition situation quantization $i_t$ and the history student information update $\tilde{C}_t$ are updated through Equations (2) and (3), and the history student competition situation is updated through Equation (4). In Equations (5) and (6), part of the competition condition $o_t$ with low correlation is discarded, and the final race condition prediction result $h_t$ is obtained. In this training, the model combined with AM not only considers the winning situation of individual students in the competition in a short period of time but also gives greater weight to highly similar individual students according to the competition data of all students screened by association. Inputting the recent competition data of individual students can roughly predict the future competition situation of students, which is similar to the score prediction of class activity. It is of little significance to predict the winning situation of the competition after a long time. Teachers can refer to the competition prediction of individual students in the past three months. Figure 8 is a typical chart as an example of the student competition prediction. In this experiment, we also adopt the numerical techniques in the experimental simulations due to the nature of the complex AI model itself, which is very hard to analyze using the feedback and iterative mechanism. Just by the nature of the convergence of the proposed AM-aided LSTM model, the competition award number of the proposed prediction scheme exhibits good performance in comparison to that of the real training one.

Teachers can reasonably refer to the prediction results to plan the student training program in accordance with their aptitude. It focuses on daily learning for students with unsatisfactory competition results and thus improves their enthusiasm in class. So, it guides students to strengthen learning for specific knowledge according to the correct situation of the predicted topics. Students with excellent performance and talent for competition are encouraged to actively participate in competitions to improve their academic quality through actual combat. This teaching reform is guided by the prediction of student individual model data, combined with attention-aided LSTM technology to collect student data and carry out prediction analysis. Teachers employ data results targeted to cultivate students' individual development, and then they ultimately achieve the goal of improving students' quality in an all-around way to significantly increase teaching results.

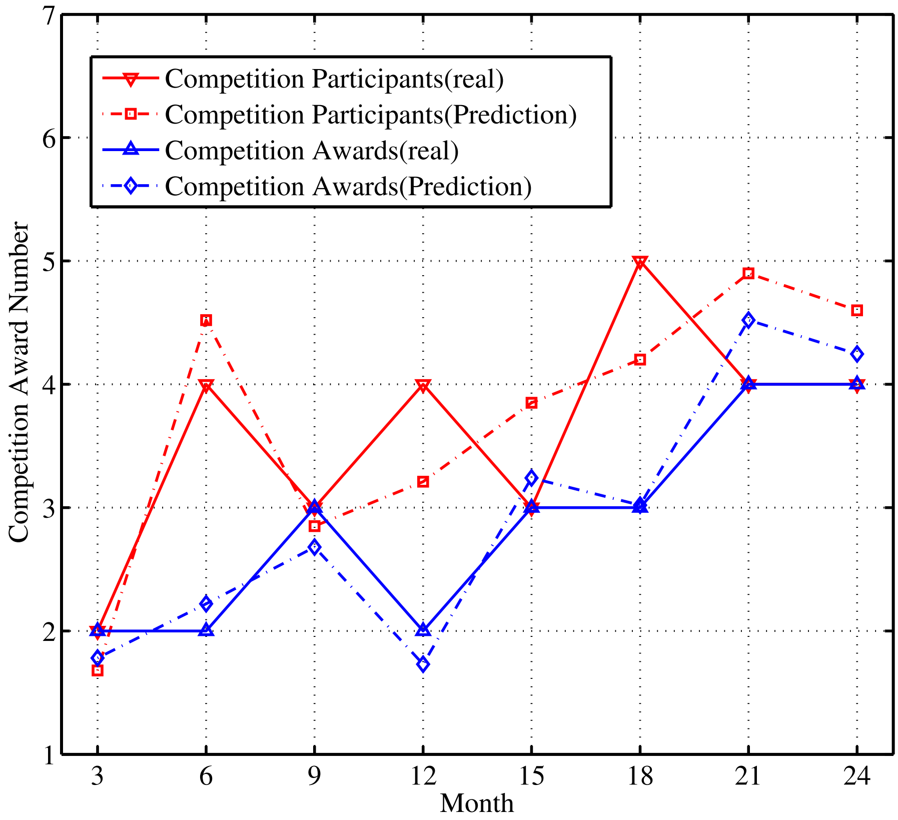


**Figure 8.** Typical student competition award prediction chart.

This teaching reform combines in-depth learning technology to recommend courses in the basic theory and practice of electronic information. It draws lessons from the idea of strengthening learning and competition within the group to help students innovate in competitions. It also uses LSTM to model individual students and to evaluate the students' own abilities accurately. Therefore, teachers can teach students according to their aptitude. After three years of practice, the experimental class and the control class were set up to compare the results. After the implementation of the new teaching reform, the experimental class improved by 10.98%, 6.84%, 14.41%, 15.31%, and 180% in performance, respectively, in the usual results, midterm results, final results, experiment results, and a number of competition results compared with the control class. Improvement is calculated as follows: (Experiment Class's Score − Control Class's Score) × 100%. In addition, the number of graduate students increased significantly, and their interest in scientific research also increased significantly. Their employment was widely welcomed by various enterprises. After the prediction of the LSTM model, the practice of teaching students in accordance with their aptitude significantly improved. The students' scientific research training, electronic competition, and enterprise practice also improved. Therefore, teaching reform exploration reflects a better practical application effect. Finally, the achievements of three-year practical teaching reform are illustrated in Figure 9.

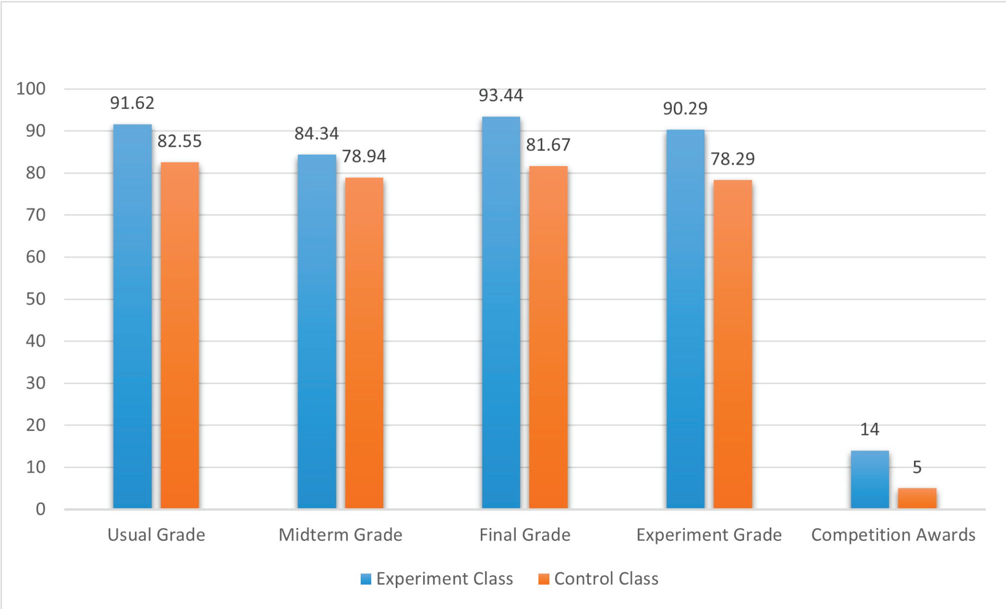


**Figure 9.** Achievements of three-year practical teaching reform.

After three years of practice, the experimental class and the control class were set up to compare the results. In the theoretical course, the average score of the experiment class was 93.44, and that of the control class was 81.67. In the practical course, the average score of the experimental class was 90.29, and that of the control class was 78.29. In terms of competition results, the experimental class won five first prizes and a total of 14 prizes in provincial competitions, while the control class won two first prizes and a total of 5 prizes in provincial competitions. After the implementation of the above teaching reform, the students had a solid foundation in mathematical modeling, and their original ability improved. Their practical and cooperative abilities in the competition made great progress compared with those of the previous traditional teaching mode. In addition, the number of graduate students increased, and their interest in scientific research increased significantly, too. Subsequently, their employment was widely welcomed by enterprises. Through the collaborative innovation mode of case-oriented learning and the practical training of stimulating learning enthusiasm, college students have a greater degree of improvement and improvement in scientific research training, electronic competition, or enterprise practice. In summary, there are the following innovations for the electronic information teaching reform, especially using AI technologies. First, an integrated teaching series platform is constructed with an open module to closely cover professional electronics and information knowledge. Second, big data management mechanism is set up to provide key links to comprehensive and innovative personnel cultivation and training. Third, the multi-module practical teaching system is built to promote college students' professional innovative learning ability and literacy. Finally, practical effect evaluation and management are proposed for innovation-oriented electronic information practice training of decision-making teaching reform by the attention mechanism-aided LSTM-related AI techniques. Currently, pedagogy is mainly classified as a social science and most of improvements in pedagogy are qualitative strategies and related methods. However, in our work, we try our best to make the quantitative measurement with the help of the AI technique, and the model parameters are tentatively improved iteratively in practice. Subsequently, the AI model is worked cooperatively for the typical prediction and it can be further improved with accurate result prediction of the future work in practice. Therefore, the teaching reform exploration reflects a better practical application effect.

## 7. Conclusions

This paper mainly puts forward the exploration of AI technology to improve the practice of teaching reform regarding electronic information. It builds a professional practice teaching model. By means of AI innovation, it recommends courses in the basic theory and practical application of electronic information. It also teaches students in accordance to their aptitude, combined with the idea of strengthening competition in the learning group to help them compete and innovate. Furthermore, AI and big data technologies are integrated to visualize students' individual data for teachers' guidance to improve students' personal quality and practical ability. The attention-aided LSTM is also used to model the learning effect of students and accurately evaluate their own abilities so that teachers can improve. In the implementation of AI innovation practice teaching reform in the future, and aiming at the problems highlighted in the teaching procedure, teachers are urged to design more practical methods suitable for students' ability training. They retain high-quality teaching cases and methods with good effect and practical tests to both improve students' personal quality and cultivate innovative talents suitable for enterprise employment, thus greatly improving students' innovative, practical ability. Finally, through the practice of innovative teaching reform, it is also helpful for teachers to reflect on the effect of teaching reform. It improves their ability to understand, specialize in, and solve problems in teaching reform. In summary, it better cultivates innovative and practical talents of students to satisfy the requirements of the development trend of the current information in society.

Due to the properties of the proposed AI model, there are still insufficient limitations for the proposed practical education reform. The practical scope of the AI model is a little sensitive to the initial input data. The theory for the proposed scheme is not complete due to the nature of the iterative AI processing scheme. Suffering from large noises, the data can be easily interfered with, and possible biases might occur in the numerical calculation. To overcome such problems, future works are proposed as follows. The following proposed semi-experience and semi-information schemes can be used to develop many projects. Thus, the nature of the AI model can be deeply investigated to better achieved the convergence of AI techniques. The scale of the parameters of the AI model can be configured for more accuracy. Therefore, an accurate AI model can be constructed for large-scale information fusion in educational reform practice.

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## Abbreviations

The following abbreviations are used in this manuscript:

| | |
|---|---|
| AI | Artificial intelligence |
| AM | Attention mechanism |
| EI-IP | Electronic information–innovation practice |
| EI-IPTR | Electronic information–innovation practice teaching reform |
| LSTM | Long short-term memory |
| RNN | Recurrent neural network |

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