

Research and Exploration on the Integration of Science and Education to Promote the Personalized Development of Students

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Abstract: The integration of science and education is an effective way to explore students' individual potential and promote their individual development. On the basis of fully understanding the promoting effect of science and education integration on students' personalized development, this paper explores from three aspects of practical teaching reform, subject competition and scientific research and education cooperation, summarizes the achievements and shortcomings in practice, and puts forward some thoughts and suggestions for guiding students to participate in scientific research, promoting students' personalized development and cultivating students' innovation ability.

1. Introduction

Scientific research in colleges and universities is an effective teaching and learning method, which not only plays an important role in improving teachers' quality and promoting discipline construction, but also has positive significance in promoting students' personalized development and cultivating students' innovation ability. University's scientific research ability is not only determined by the university's scientific research ability and level, but also a very important indicator is the level of the university's scientific research ability and level of training students. The outline of the national medium and long term education reform and development plan (2010-2020) proposes that colleges and universities should establish a new mechanism for the cultivation of innovative talents with interaction between scientific research and teaching, actively guide students to participate in scientific research, strengthen practical teaching links, and strive to cultivate innovative talents with high quality.

2. Thinking on Promoting Individualized Development of Students through Science and Education Integration

2.1 The Practical Significance of the Concept of Science and Education Integration

The key to a strong country in science and technology is to build a talent team with excellent quality and innovative ability. It is an important way to cultivate innovative talents to integrate the latest achievements of modern science and technology into classroom teaching and guide students to participate in scientific research. In May 2016, General Secretary Xi Jinping stressed in his important speeches at the National Conference on Science and Technology Innovation, the Congress of Academicians and Academicians of the Chinese Academy of Sciences and the Ninth National Congress of the Chinese Association for Science and Technology that the spirit of innovation should be promoted and the talent team meeting the requirements of innovation and development should be cultivated. Under the guidance of teachers, it is of vital importance to train students' innovative ability and practical level to enable them to carry out scientific research and exploration, integrate the knowledge they have learned, and improve their ability to analyze and solve problems.

2.2 The Importance of Individualized Development of Students

Taking students as the basis is the embodiment of the idea of people-oriented in education. The

cultivation of individualized talents focuses on the concept of student-oriented and on promoting the individualized development of students. Education is to foster strengths and avoid weaknesses, find out the bright spots of students' development, and on the basis of independent selection of rich educational resources, strive to explore the potential of students through targeted and distinctive education.

2.3 Promoting Effect of Science and Education Integration on Individualized Development of Students

The core of personalized development is the development of creative spirit, and personalized development is the only way to innovation. One of the key characteristics of innovative talents is that they can discover problems and have the ability and scientific literacy to solve problems creatively, which can be promoted by participating in scientific research activities. Scientific research activity itself is to creatively solve unknown problems and put forward innovative theories and solutions. It can be seen that adhering to the close combination of scientific research and talent training is a powerful measure to promote the personalized development of students and cultivate innovative talents.

3. Practice and Exploration of Integrating Science and Education to Promote Individualized Development of Students

3.1 Practice Assessment Process to Improve Students' Practice Level and Continuous Improvement

The Outline of the National Medium-and Long-Term Education Reform and Development Plan (2010-2020) points out that higher education “should support students to participate in scientific research, strengthen practical teaching links, promote the interaction between scientific research and teaching, and combine with the cultivation of innovative talents”. Students majoring in computer need rich practical experience and strong dynamic ability. The team is committed to the research of the next generation Internet technology, focusing on the close combination of scientific research and teaching while carrying out scientific research.

(1) Combination of Reality and Reality to Enhance Students' Practical Ability

The computer network architecture is inherently abstract, and the experimental teaching is just to improve students' perceptual knowledge and help them to understand the abstract OSI seven-layer architecture. Under the Cisco Packet Tracer simulation environment, the operation of the graphical interface makes many configurations relatively simple. Students can basically get correct results as long as they follow the experimental requirements. In this way, the significance of the experiment and the difficulty of the experiment are not reflected, and the effect of experimental teaching is not ideal.

Adjust the original network laboratory, put switches, routers and other equipment on the experimental table, cooperate with the original network wiring laboratory, form the “computer network” course physical environment laboratory. From the pure virtual experimental environment to the virtual-real experimental environment, the Cisco Packet Tracer simulation environment is used to explain the experimental principle and preview the experiment, while the students' experimental process is carried out in the physical environment.

In the experiment in the physical environment, students are directly faced with the physical equipment. Topological structure from simple to complex, the whole process students are facing the physical connection, configuration, debugging, testing. In this process, the students gradually connect the devices and their functions one by one in front of them with the device icons of different layers in the system structure diagram in the theory class, and then understand and understand the abstract OSI seven-layer network architecture. In the experiment in the physical environment, what line to use, what interface to connect to, different interfaces have different functions, and interfaces correspond to IP addresses ... A series of problems make things that naturally happen in the simulation environment become frequent. Students should find problems

and solve them through debugging and configuration modification. In this process, students' practical networking ability can be improved.

(2) Group Cooperation to Cultivate Students' Team Consciousness

It is very important to cultivate students' group consciousness and ability to work together, and to embody the cooperation consciousness and team spirit for students to enter the society in the future and do a good job. In the process of training students, the curriculum should be taken as the carrier, and the negotiation, dialogue, communication and cooperation between teachers and students, and between students and students should be promoted in the form of team activities.

In the Cisco Packet Tracer simulation environment, each student is facing the computer alone to complete the "Computer Network" course experiment. Apart from consulting teachers when there are problems, students seldom need to communicate, let alone cooperate.

In the physical environment, the experiments are grouped according to the complexity of the experiments, and the network cable experiments are made in groups of two, and the cross-switch experiments are made in groups of four. As the complexity of the network topology increases, communication and cooperation between groups can also be carried out. In this group cooperation mode, the group members who are responsible for the equipment connection, who are responsible for the line inspection, who should configure the switch, who should configure the router ... All the problems in these experimental links are assigned to the group itself. Students need to cooperate with each other and work in a division of labor in order to improve efficiency and complete the experiment with good quality and quantity within the specified time. In this way, not only can more students participate in the practice under the limited experimental environment, improve the quality of practical teaching, but also cultivate their group consciousness and ability to work together.

(3) Process Assessment to Strengthen Students' Active Learning

The assessment standard only pays attention to the results but not to the process, which will lead some students not to work hard at ordinary times, to make surprise review at the end of the term, to rely on instantaneous memory, to write down knowledge points before the final examination, and not to really master what they have learned. Moreover, if the examination in practice is done by traditional methods such as examination papers, the true level of students in practice cannot be detected.

The assessment process of the experimental link of "computer network" course will be made. The final examination shall be based on the usual results of each experiment and the experimental report to complete the comprehensive quality evaluation. Each experiment will be conducted in class to check the completion degree and results of the experiment, and the evaluation score will be given. The final score of the experiment will be comprehensively evaluated in combination with the experiment report submitted by the experiment. The assessment criteria will be made public to students at the beginning of the semester, explaining the detailed rules, so that students can understand that there is no final examination for the course assessment, and the course results depend entirely on the usual process assessment.

Judging from the classroom effect, students' enthusiasm for learning computer network practice courses obviously exceeds their theoretical study. There are also cases of students taking leave of absence, being late or absent from classes in theory classes, while the whole experimental class is attended by all the students on time.

Judging from the experimental process, most of the students were able to take active actions at the experimental site. Because everyone's experiment process and experiment results are different, and the experiment process and results have been recorded and scored on the spot, so the students faithfully record the experiment report according to their own experiment process.

From the point of extra-curricular tutoring, students often put forward various questions about how to do experiments and how to solve various experimental errors online through QQ.

Judging from the feedback, students are both approved and afraid of this process-based assessment method. The reason for recognition is that most students can clearly realize that the purpose of doing so is to improve their practical ability. Fear is due to the fact that after the examination process is changed, one cannot relax in one's daily study other than the final

examination. Every experiment must be prepared as carefully as an examination.

(4) Continuous Improvement and Gradual Improvement

The reform of the experimental link of “computer network” course is adjusted step by step, and then gradually improved according to the teaching effect and feedback from students. The first is the transition from a virtual experimental environment to a virtual-real combined experimental environment to increase students' awareness and perception of actual network equipment and environment. Then, adjust the proportion of usual results, increase the proportion of usual experiments in the final examination results of the course, and strengthen students' active learning. Finally, the course examination will be completely process-oriented and the students' practice level will be improved as a whole.

The whole improvement measures will continue. On the basis of listening to students' opinions, the next step will increase the freedom of experiment. That is, there are both necessary and optional experiments. Most students can pass the course after completing the necessary experiments, while optional experiments can achieve high scores. Scoring standards need to be finer and more quantitative, etc.

3.2 Stimulating Students' Interest in Learning through Achievement of Subject Competition

Scientific research does not take place overnight and requires constant learning and accumulation. The cultivation of scientific research ability is not a one-day achievement. It needs to be targeted and sustained. Facing up to the problem of students' individual differences, students at different levels have great differences in knowledge structure, professional skills, interests and hobbies due to different starting points, different foundations, different growth environments and other reasons. Guiding students to participate in scientific research must be guided by students' personalized development needs and be carried out in different directions and levels according to students' professional skills, interests and hobbies.

(1) Guided by Competition and Guiding Students' Scientific Research Direction

Regular school-level discipline competitions within the curriculum system. With the guarantee and encouragement of promoting learning through competition, the college will launch discipline competitions at different levels of grades, colleges and schools according to specialties, disciplines, courses, themes, etc. On the one hand, through the competition mechanism, improve students' interest in learning. Students have already shown a tendency in the direction of scientific research when they choose the competition. In the process of preparing the competition works or examination questions, they give full play to their initiative in learning, independence in solving problems and creativity in designing. On the other hand, through the competition mechanism, personalized students from different directions are explored. There are individual differences among students. Through competitions, students with outstanding performance in some aspects, solid discipline foundation and basic scientific research quality can be discovered, which is also consistent with the needs of students' individual development.

(2) Training Students' Independent Consciousness through Competition and Communication

Discipline and professional competitions should not only stay in the school, but also lead students out of the school gate to participate in higher-level professional competitions and compete with other college students in a wide range of exchanges.

In the preparation stage of the competition, students' learning ability is trained. Professional competitions often integrate theoretical knowledge, practical ability, applicability and creativity into a whole, and comprehensively examine students' comprehensive abilities. This requires the participating students to sort out their knowledge, consult data, find problems and solve them in a timely and effective way in a relatively concentrated preparation time. For example, in Hubei province's cyber space security practical ability competition, students need to build a virtual target machine in a short time, learn to use various offensive and defensive software, and write scripts. Although they have a certain theoretical basis for learning through the course of “Network Security Technology”, they need to have strong learning ability to digest and master the complex virtual environment and dozens of offensive and defensive software.

At the stage of competition and communication, students' independent consciousness will be trained. The main body of students' professional competition is students, and the guidance teacher can only guide and help students in the preparation stage of the competition. The student team competed and defended, answering various questions raised by the judges on the spot. This, of course, requires students to have sufficient preparation before the match, but more importantly, they should be able to show their strength independently and break away from their dependence on teachers.

At the conclusion stage of the competition, train students' enterprising consciousness. Competition is only a way to promote students' active learning. The end of competition does not mean the end of learning, but should be summed up after the competition. If no results are achieved, students need to think about the reasons and shortcomings of the failure and how to improve it.

(3) Competition Results Stimulate Students' Interest in Scientific Research

Students participated in the professional direction competition and achieved certain results. These achievements not only affirm the participation of student groups in scientific research, but also stimulate the scientific research interest of the majority of student groups. Through competition training, peer exchange, online and offline preliminaries finals, award presentation and other forms to further improve students' professional ability and professionalism. Through the whole campus network news reporting, the students returning with good reputation preaching and reporting, etc., the enthusiasm of the students in the whole college is stimulated.

3.3 Scientific Research and Teaching Cooperate to Cultivate Students' Scientific Research Ability

Scientific research is a complicated and changeable system chain. Teachers form a complete system of scientific research from paying attention to scientific frontiers, researching and discussing problems, to consulting scientific documents, establishing scientific research topics, applying for projects, to the research process (research, experiments, etc.), publishing papers, identifying achievements, transforming achievements, etc. The various links involved have different educational effects and forms, some of which are obvious and some of which are implicit. More often, the educational effect can be achieved only by means of teaching.

(1) Refine the direction of scientific research and popularize cutting-edge knowledge

Teachers themselves need to have scientific research direction, and pay attention to the scientific frontier by attending academic conferences and reading reviews in the discipline field, so as to understand the background, current situation and prospect of the selected direction. This process will involve a great deal of cutting-edge information on the development of disciplines. The content can be combined with the course teaching, on the one hand, to improve students' interest in learning the course, on the other hand, to popularize the frontier knowledge of the subject.

When the course of "computer network" is summarized, the importance of the course of "computer network" can be reflected in combination with general secretary Xi Jinping's strategy of strengthening the country through network. When the course of "Network Security Technology" is being summarized, it can not only reflect the importance of the course, improve students' interest in learning, but also educate students from the perspective of national security, in combination with the assertion of General Secretary Xi Jinping at the national conference on network security and informatization.

(2) Study scientific research methods and cultivate scientific research ability

In the process of scientific research, teachers use scientific research methods such as consulting scientific literature, investigation and experiment to integrate into the teaching process, so that students can learn relevant scientific research methods and improve their scientific research ability.

Teachers guide students to write papers. From literature search to sorting to extensive reading to intensive reading to learning to sorting, from topic selection to abstract to framework to writing to reference to format. This series of processes not only require teachers' guidance and demonstration, but also require students to learn and practice through teaching and scientific research links such as arranging course examination papers, guiding graduation design papers, writing project application

forms, etc., and gradually master and standardize them.

Teachers lead students to do research. The combination of theory and practice is often what students lack. How to conduct research, find problems from the actual environment and make the research have practical significance is also the need for students to form this kind of consciousness from practice to practice.

Teachers and students jointly experiment. An important link in scientific research is experiments. The improvement of algorithms, the optimization of structures, the verification of creative problem solving and so on all need to be calculated, adjusted and compared through a large number of experiments and simulations. Scientific research experiments are different from curriculum experiments. Curriculum experiments are generally confirmatory experiments, that is, to verify the correctness and effectiveness of corresponding theoretical knowledge points through the experimental process and results. Scientific research experiments are full of unknown uncertainties. They should not be carried out step by step according to established procedures, but should be innovative and try different methods constructively. Then according to the results of the experiment, we will think about whether the research process is correct, where the problem is and how to adjust it. Then many times, repeated experiments, adjustments, statistics ... such scientific research experiments have never been smooth sailing, and teachers and students should start together. On the one hand, arouse students' curiosity and enthusiasm for exploring the unknown, improve students' ability to analyze and solve problems, and cultivate students' innovation ability and practice level; On the other hand, it encourages students to bear the pressure of failure and frustrate education. The road of scientific research must be "a long way to go", and teachers should cultivate students' courage and perseverance of "I will go up and down to seek".

4. Conclusion

At the same time of carrying out scientific research, we should explore students' participation in scientific research and strengthen practical teaching to promote students' personalized development. Teachers' training and guidance in the integration of science and education need to be strengthened. In scientific research, emphasis is placed on the training of scientific research methods and skills, on the cultivation of scientific research practical ability, and on the frontier scientific research knowledge in related fields, as well as the methods and strategies for transforming scientific research into teaching results. Teachers combine these with teaching contents and impart them to students through rich teaching methods, means and organizational forms.

Students have a correct understanding of the significance of science and education integration to promote their own personalized development. University students should realize that university activities include not only professional courses but also scientific research. The society's demand for talents is not only to have rich theoretical knowledge, but also to have higher practical level and stronger innovation ability, and to have the ability to improve the analysis and solution of problems.

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