

Discussion on the Infiltration of Experiential Career Education Concept in Biology Teaching in Senior High Schools

Liyan ZHANG^{1*}, Xingyan XU², Lihua ZHAI³

1. Changchun Jiutai District No.3 Middle School, Changchun 130500, China; 2. Changchun Normal University, Changchun 130032, China; 3. Middle School Department, Huayue School of Changchun Jingyue High-tech Development Zone, Changchun 130000, China

Abstract Based on the implementation of the new college entrance examination reform policy and the demand of related policies, the choice of subjects for high school students has shifted from the traditional relatively single model of arts and sciences division to the "3+3" model, and the topic of "how to infiltrate the concept of career education in the teaching process of senior high schools" has become increasingly important. However, at present, the implementation of career education in senior high schools is frequently limited, mainly in the form of class meetings, which instills the concept of career education to students. Therefore, the implementation effect is often not satisfactory. Therefore, experiential learning, a novel and efficient learning method, has entered public's view. Based on relevant research literature at home and abroad, we started with the importance and urgency of implementing career education in high schools, and generally reviewed the research status and future development trends of experiential career education both domestically and internationally. The practical and theoretical significance of the research were explained, and relevant concepts were summarized. Finally, strategic suggestions were proposed for integrating experiential career education concepts into biology teaching in ordinary high schools in China.

Key words Experiential career education; High school biology; Teaching infiltration; Idea

DOI:10.19759/j.cnki.2164-4993.2023.06.016

In the early 20th century, the concept of "career education" was first mentioned in the vocational guidance theory proposed by Parsons in the United States. Moreover, the commissioner of the U. S. Office of Education, Marland, has repeatedly delivered public speeches on career education ideas, expressing his own views on career education. Afterwards, the concept was officially recognized, and more and more people are committed to promoting the concept of career education on a large scale and striving to implement it. From the perspective of the development level of career education in foreign countries, it is not difficult to see that countries attach great importance to career education for students of different ages.

On the other hand, compared with China at this stage, the research on the concept of career education is still in the initial exploration stage, and it is still slightly unfamiliar in the implementation of ordinary high school education^[1]. Career education started relatively late and has a relatively small scope. The current situation of career education is that its implementation mainly focuses on imparting career planning knowledge to students and further education, or only provides guidance for students' future employment^[2]. For such career education, its implementation mode often leads to the situation that students have less autonomy and are in a passive position under this education. The most important thing is ignoring the needs of students for their current life planning and development of ability to adapt to society in the future.

In view of the research on related issues in the process of

implementing career education, scholars have found that there is certain connection between "experiential learning" and "career education", and the combination of the two can make career education achieve unexpected results in the implementation process^[3]. Therefore, in recent years, some researches on experiential career education and its implementation in ordinary high school education have emerged in China. Relevant research shows that in all kinds of teaching activities in the student stage, effectively integrating the concept of experiential career education into the classroom can obviously improve students' learning vitality, and can better reflect the implementation of the concept of "taking students as the main body"; and in terms of teachers, teachers can be urged to strengthen their teaching quality and effectively improve their teaching level, while optimizing the quality of classroom activities. Therefore, based on relevant research results of experiential career education in China, this paper put forward some specific implementation strategies and suggestions for developing experiential career education in the process of biology education in ordinary high schools.

Significance of Penetration of Experiential Career Education Concept in Biology Teaching in Senior High Schools

Since the mid-1990s, domestic scholars have rapidly launched research on experiential teaching^[4]. The research on experiential career education is expected to develop in the following aspects in the future: at present, due to the educational demand and pressure in China, relevant education in ordinary high schools has become the focus of public attention, and the research momentum of experiential career education in ordinary high schools has

Received: August 17, 2023 Accepted: October 18, 2023

Liyan ZHANG (1979 –), female, P. R. China, secondary teacher, devoted to teaching and research of mathematics education.

* Corresponding author. E-mail: zhanglihui_91@163.com.

also sprouted. Meanwhile, experiential career education has not only expanded its research field, but scholars have also gradually refined its research level, expanding to its penetration in subject teaching. For example, Long *et al.*^[5] proposed implementation strategies for integrating career education into high school geography teaching based on the theory of experiential learning circles and the purpose of career education in their book, *Infiltration of Experiential Career Education Concept in High School Geography Teaching*. Chen^[6] and Tian^[7] have also successively published papers in journals proposing new teaching strategies for efficient application of the experiential career education concept in high school geography teaching activities. It can be seen that the research perspective and focus of experiential career education have begun to develop towards the direction of subject infiltration, and integrating career education naturally into the classroom is the focus of creating experiential career education. At present, the research focuses on exploring the combination of biology classroom teaching and career theory knowledge, and puts forward the infiltration of experiential career education into subject teaching^[8]. The application of experiential career education theory to the study of biology teaching in senior high schools has following significance: first, it provides assistance for improving the theoretical basis of teaching reform and supplements biology teaching strategies in senior high schools. Second, it promotes the extension of career education in senior high schools, enriches the theory of career education, and provides reference for the theoretical research of combining other disciplines with career education.

In practice, based on problems existing in practical implementation of career education proposed by other studies, teaching strategies of experiential career education in biology teaching are provided^[9]. On the one hand, suggestions are provided for concrete implementation of experiential career education. On the other hand, new ideas and new ways are also provides for high school biology teaching practice, which enriches teaching methods, improves the teaching effect of biology to a certain extent, and deepens the reform of biology curriculum in ordinary high schools. Carrying out experiential career education in high school biology teaching can greatly stimulate the interest of high school students in learning biology, and is also beneficial in cultivating students' biological thinking ability.

Strategies and Suggestions for Conducting Experiential Career Education

How can we effectively realize the role of experiential career education in the process of subject teaching? Teachers should first make clear the concept of experiential career education and emphasize the necessity of experiential career education in the teaching of various subjects in senior high schools. In this way, we put forward following strategies and suggestions on developing experiential career education in the classroom in terms of the concept of experiential career education in high school biology teaching

strategies.

Creating a teaching context and a relaxed learning atmosphere

Creating a classroom with a good atmosphere can actually help students perceive, absorb and understand knowledge^[10]. In this regard, teachers can highlight the life and interest of biological knowledge in the classroom by creating real classroom situations, thus attracting students' attention more. Regarding how to choose appropriate teaching situation types, teachers need to increase the authenticity and effectiveness of the situation from the perspectives of relevant teaching knowledge content, students' cognitive level, hobbies and age characteristics, so that students can be convinced and immersed in it, and thus an ideal teaching effect can be achieved.

Take *Crossbreeding and Mutation Breeding* as an example, teachers should first prepare lessons in advance. Therefore, in the real classroom application, we fully prepared lessons before class, and collected relevant teaching videos, pictures and news examples, such as: space breeding, hybrid rice, variant fruits and vegetables and so on. We looked for some news examples about mutation breeding and crossbreeding in advance as a guide before class, so that students could intuitively obtain some products about mutation breeding and crossbreeding that happened in our real life. We also used examples of real-life phenomena to help students connect theory with life, thereby better guiding them to discover problems in life. Using video materials, text materials and other forms, students' attention was drawn to the classroom, while also creating a rich and fun classroom environment for them. Therefore, we used hybrid rice as an example of hybrid breeding and demonstrated to students through video format how Mr. Yuan Longping personally practiced, endured numerous scientific research attempts, and ultimately cultivated hybrid rice, which allowed the majority of the Chinese population to obtain sufficient food and greatly alleviated the tragic situation of "people not having enough to eat" in the past. Firstly, students learned knowledge about the course; second, students could also understand that it is hard to live a full life now, and that food is precious, so they should cherish food and participate in the clean your plate campaign; and third, students could also understand that scientific research is not easy, and it is acquired through the hard work and perseverance of several generations, so it can cultivate students' correct scientific values, and simultaneously stimulate students' patriotic feelings and serve the country with their dreams. We tried to control the duration of videos to about 3 min, which not only played the role of video teaching, but also did not take up too much time in class, so that we could finish the teaching content that we should finish. The news of space breeding is not uncommon recently. We showed it to students in graphic form in class, including both excellent varieties brought by space breeding and some examples of mutation failure in space breeding to inspire students to think. The direction of mutation cannot be controlled,

and most of them do more harm than good. We taught students knowledge while broadening their horizons and making them understand that science and technology has two sides and not all of them are beneficial.

After class, through the feedback from fellow teachers, everyone agreed that the teaching effect was gratifying. Combined with the positive performance of students in class, it is obviously that they immersed in the teaching situation we created. Moreover, in the process of knowledge consolidation and practice, we could see that the students have a good grasp of what they have learned in the class. After class, they can fully master it with a little active consolidation practice.

With the help of multimedia, students can know that the knowledge resources in life are rich and colorful, so that students can acquire knowledge from many aspects, which can not only improve their sensitivity to information, but also cultivate their information processing ability. Teachers should also constantly strengthen the expansion of their own knowledge and the promotion and development of their comprehensive ability, and connect different types of knowledge and knowledge concepts in a more harmonious and suitable way, which can help students get a better learning experience and effectively enhance the charm of biology.

Adopting micro-course teaching to enhance students' independent experience

In the current era of information technology, the use of information technology in classrooms has become increasingly widespread. Micro-course teaching, as a very important part, can also be seen in current classrooms. Important and difficult knowledge can be highlighted using micro-class teaching, and conveyed to students by recording videos before class, and students can watch and learn by themselves, which increases the experience opportunities for students to learn related content independently^[11]. Therefore, the application of micro-course teaching can also become an important medium for conveying and infiltrating the concept of experiential career education in subject teaching. For example, when learning the content of *Regulation by Hormones*, teachers can record micro-videos around important and difficult knowledge such as "common sense of blood sugar, sources and destinations of blood sugar, and ways of hormone regulation", so that students can watch them independently before class. Nowadays, more and more novel teaching methods are emerging, but the general direction is becoming more and more information-based and technical.

Therefore, in order to practice the teaching mode advocated by the new curriculum reform and give students more autonomy, we regarded this class as a new teaching trial. Through vivid explanation and picture display in the videos recorded before class, we could help students better learn about the teaching content of this class and realize the richness of biology knowledge in senior high schools. Changing the traditional teaching mode of "teachers teach and students listen" in the past, students are obviously

willing to cooperate with this new teaching form and increase their interest in learning. Studying in extracurricular spare time enables students to have a general understanding of relevant knowledge and master the content independently before the formal class, which can avoid spending a lot of time explaining the complicated ways of sources and destinations of blood sugar in class, thus saving time and reserving more time to help students solve problems found in the process of autonomous learning after class. Meanwhile, some unexpected teaching effects have also been achieved, that is, students with strong learning ability can absorb more quickly after studying in their spare time, and can use their time in class to conduct more in-depth exploration. Moreover, teachers can also expand their knowledge to a certain extent, laying a foundation for in-depth learning in the future. For students who generally lack strong learning ability, pre-class learning can also serve as a good learning habit which encourages students to develop pre-class preparation and allows them to understand the content in advance, so that they will not be unable to keep up with the classroom progress.

However, the actual teaching effect is not optimistic, so we also reflected on it. Due to our lack of proficiency in using this new teaching method, we did not achieve expected learning effect. We ignored the fact that students' learning consciousness has not reached the point that no supervision is needed. High school students are still underage students, and it is natural for students to enjoy playing. Students have been suppressed for a long time in learning multiple courses according to schools' rules and regulations, and in this situation, it is indeed difficult for students to find time to complete the learning tasks that should have been completed in the classroom. The actual classroom time has not decreased but increased, which is still quite difficult for most students to implement. Therefore, in the real classroom time, there is an obvious phenomenon. Students who study actively at ordinary times basically digest and absorb relevant knowledge after class, and prepare the problems found in advance to discuss and communicate with teachers in class, so that their learning ability is improved. On the contrary, students who don't usually speak in class are becoming more and more speechless. Before class, they don't lay a good foundation for learning the knowledge in the class, and they can't keep up with the progress of teachers in class, so there is a polarized situation. Instead of improving the current learning bottleneck, there are still some concerns.

Giving sovereignty to students and developing cooperative learning groups

In traditional classroom teaching, "teachers teach and students listen" has become a mostly present mode in classroom teaching. It promotes students to absorb and understand a large amount of knowledge in a short period of time, which to some extent improves the efficiency of knowledge transmission. This is undoubtedly a phenomenon that will inevitably occur in order to allow students to acquire more knowledge within limited classroom

time under the coercion of the current situation of students' academic pressure^[12]. However, such teaching method can easily lead to students being in a passive position in accepting knowledge, and it is a problem that teachers instill knowledge into students instead of students taking the initiative to acquire it, which greatly hinders the improvement of students' interest in learning biology and the development of biological core literacy. In order to change this situation, it is necessary to strengthen students' sense of knowledge experience and turn passive into active. Accordingly, teachers should change the teaching form in time, and cooperative learning is a good choice to improve students' dominant position in learning. For example, when studying the content of *Protein — The Main Undertaker of Life Activities*, before starting this class, we asked: What proteins are there in life? What proteins are present in the human body? What are the functions of protein? Why is protein the main undertaker of life activities? Questions such as these are closely related to the teaching content of the class, and they can attract students' attention in the classroom and activate their thinking, gradually leading to the main content. After learning the key knowledge, an expanded and extended little information was provided: collagen can be used to make surgical sutures because it can be absorbed by the human body and avoid the pain of suture removal. Teachers could then propose specific thinking questions to students and encourage them to collaborate in groups for collective exploration.

Two discussion questions were further raised: 1. Why can this suture be absorbed by human tissues? 2. What chemical changes can occur to this suture in order to be absorbed? 3. What are the implications for your understanding on the chemical composition of proteins? The first and second questions are knowledge-based questions that align with the knowledge learned and assess students' level of mastery. The third question is an open-ended question. Under the guidance of questioning, students can think and discuss on their own, gain a preliminary understanding of the knowledge learned, and deepen their understanding of the problem. Next, through communication between teachers and students, teachers' speech guided students' thinking towards the expected direction, and finally allowed students to independently obtain information, increasing their learning autonomy. Through students' thinking about problems and the participation of different students, students can exchange different ideas and analyze problems from multiple perspectives, thereby improving the learning effectiveness of biology. Therefore, in high school biology teaching, teachers should actively apply experiential career education ideas to classroom teaching, which can improve students' learning efficiency and promote teachers' overall teaching.

Conclusions

Such collaborative learning teaching model is not very novel

and has fewer problems in the actual implementation process, making it easier to implement. Therefore, it has been often used in classroom teaching. In the teaching process, great emphasis is placed on students' experience in the classroom, which fills them with a passion for exploration and can also enhance their self-learning ability. Through cooperation and communication between students, as well as discussions and exchanges between students and teachers, we aim to promote cohesion among students and the harmonious development of teachers and students. To a large extent, it enhances students' interest in learning biology and invisibly cultivates and develops their core biological literacy. The cooperation between students has strengthened their knowledge experience and achieved good teaching results. However, in real classroom teaching, teachers' decentralization is still insufficient. Although students have some autonomy, most of the autonomy is in the hands of teachers. Therefore, teachers should fully decentralize, organize study groups and guide students to explore. Initial results have been achieved, but the teaching reform should not be carried out too hastily, but step by step. What we have achieved could be regarded as the first step for cooperative learning to replace traditional teaching.

References

- [1] GU H. Research on the current situation of career education curriculum in ordinary senior high schools[D]. Qufu: Qufu Normal University, 2019. (in Chinese).
- [2] RAO YY. Application of experiential teaching in biology teaching in senior high schools[D]. Nanchang: Jiangxi Normal University, 2021. (in Chinese).
- [3] ZHANG NH. Research on the application of experiential teaching in college career education courses[D]. Nanchang: Jiangxi Science and Technology Normal University, 2016. (in Chinese).
- [4] LUO WH, LUO P. Research and practice of experiential career education under the background of new college entrance examination[J]. Comparative Study of Cultural Innovation, 2020(31): 1–3. (in Chinese).
- [5] LONG ZX, ZHANG ZS. Infiltration of experiential career education concept in geography teaching in senior high schools[J]. Geography Teaching, 2020(13): 25–28. (in Chinese).
- [6] CHEN JJ. Infiltration of experiential career education concept in geography teaching in senior high schools[J]. Geography Teaching, 2021(02): 53–54. (in Chinese).
- [7] LIU Y. The practical study on infiltration career planning education in biology teaching in senior high school[D]. Dalian: Liaoning Normal University, 2019. (in Chinese).
- [8] LE XR. Research on teaching design of efficient experiential career planning[D]. Shanghai: East China Normal University, 2008. (in Chinese).
- [9] ZHU WL. Research on the effectiveness of classroom teaching of career education in ordinary senior high schools[D]. Shanghai: East China Normal University, 2018. (in Chinese).
- [10] CHEN QX. Research on ideological and political experience and career education in senior high schools[D]. Shanghai: Fujian Normal University, 2020. (in Chinese).