

# Exploration on the Improvement of Learning Motivation in the Teaching of the C Programming Language Course

Hua Liu<sup>1, a</sup>

<sup>1</sup>College of Mechanical and Architectural Engineering Taishan University, Taian 271000, China  
<sup>a</sup>156634295@qq.com

## Abstract

**This paper focuses on exploring practical and useful methods to improve students' learning motivation in the teaching of the C Programming Language. First, guide students to understand the development trend of the future society, make reasonable career planning and have long-term goals, then students will invisibly improve their long-term learning motivation. The second is to explore how to broaden students' horizons through typical cases in the history of IT development in the course of teaching, and the mode from easy to difficult can gradually enhance students' self-confidence and stimulate their interest in learning; It is more helpful for students to overcome their fear of difficulties by explaining the logic and concepts of scientific calculation in simple terms with simple life examples. In addition, taking part in high-level scientific and technological competitions and other means will be more conducive to cultivating innovative talents.**

## Keywords

**Interest; Learning motivation; The C Programming Language; Internal dynamics.**

## 1. Introduction

The C programming language mainly trains students to realize intellectualization by program design. This course focuses on cultivating students' logical thinking ability to solve problems. The C language is widely used in embedded system because of its powerful function and high efficiency. The C language is a very practical course. It not only needs to master the basic grammar, but also needs to design and implement algorithms through programming practice. Only through lots of programming practice, can the level of programming design be improved in the process of correcting errors.

For its characteristic of strong logic, the C language requires high practical ability, which is significantly different from other courses. As each specific problem needs to be designed with reasonable algorithms through abstract thinking and realized through program debugging, it tests the careful logical thinking ability to solve practical problems. In addition, the grammar is complicated, which makes it difficult for many students. Due to the fear of difficulties, every programming failure is a blow to their self-confidence and will soon lose their interest in this course. Only by stimulating students' learning motivation and teaching students according to their aptitude can students' programming ability be improved [1].

## 2. Key Factors to Improve Learning Motivation

Learning motivation is the psychological driving force generated on the basis of students' value judgment of learning behavior, which is composed of learning motivation, learning interest and learning attitude. Learning motivation can be divided into internal motivation and external motivation. Internal motivation is an independent force of students' spontaneous learning. It takes motivation as the core, including self goal pursuit, interest, confidence, effort and other

main factors. External motivation is a kind of learning force induced by external incentives, which is driven by external incentives or pressures, including rewards or punishments given by social, family, school and other factors [2].

For college students, the general lack of learning motivation are caused by the lack of future career planning, lack of self-improvement and self-esteem, and lack of motivation from school and family[3]. At present, the school pays more attention to urging teachers to improve the teaching quality and teaching level, but has long neglected the improvement of students' internal motivation. If the students have no interest in learning, the teaching facing the embarrassing, above the classroom teacher of passion, students will be sleepy straws.

Teachers' motivation and guidance are external factors. If students' internal motivation is insufficient, it is difficult for external factors to play a role. Therefore, internal power is the key, for the internal motivation has a more stable, lasting and stronger effect. We focus on internal and external integration to stimulate students' interest in learning and increase their successful experience, so as to enhance students' confidence in learning motivation.

### 3. Guide Students to Make Forward-looking Career Planning

The future society will be a highly information-based and intelligent era. The Internet-of-Things ( IOT) and artificial intelligence will profoundly change our lives. The C language has been widely used in embedded systems, and the embedded system based on C language programming, as the "brain" of a device, will become the "soul" of the intelligent system. In teaching, we should constantly lead students strengthen their understanding of the future social development trend. We can lead students to realize that the foundation of intelligent is the concrete programming of algorithms from some typical development trends.

For example, in the future automobile industry, maybe electrification and autonomous driving technology are the key. In the more core automatic driving technology, students can be guided to know Intel's Mobileye advanced driving assistance system based on lidar and monocular vision. Tesla's automatic driving technology is based on artificial intelligence and machine vision bionic technology. It uses cameras and millimeter wave radar, selects cameras and silicon-based neural networks, and simulates the biological neural network system of biological eyes and brain. Based on the strong GPU technology, Nvidia's automatic driving chip has the industry-leading computing power.

After such a comparative analysis, students will know the importance of automatic driving technology, but many students will wonder what this has to do with C language? Then next, the introduction of software to judge that the vehicle exceeds the safe speed of 120km/h and programming with C language is a simple two branch judgment and selection structure:

```
if (V > 120) printf ("vehicle overspeed alarm");  
else printf ("normal vehicle running")
```

The bottom layer of complex artificial intelligence automatic driving software is realized by basic programming. Through such an example, students will realize the important position of C language in embedded programming and realize that in the future trend of intelligence, all intellectualization will be realized by programming.

### 4. Cultivate Students' Interest in Learning C Language Programming

#### 4.1. Lead Students to Know the History of IT Industry Development

Due to the rapid development of the IT industry, many talents have emerged in the process of industry development. Therefore, some typical cases are interspersed in the course of lectures to inspire students to explore the fun of the programming world. For example, in 1970, Dr. E. F. Codd first proposed the concept of relational database. Inspired by this, Ellison created a new

database named Oracle, which ushered in a new era of databases. This example is particularly popular for students. They have never realized that behind the tedious programs of modern software, the content of wisdom is so high.

It can also let students know the development status of GIS and ERP software. In the process of popularizing software knowledge of various industries, students can realize that the software industry is so broad and occupies an increasingly important position in many fields. Programming ability is the core skill in the future with intelligence and information.

#### **4.2. Start With Simple Examples and Gradually Improve Their Self-confidence**

Practice shows that stronger self-efficacy and positive outcome expectation will improve learning motivation, and then stimulate learning motivation. According to the students' psychological needs, stimulate the internal motivation of students' learning. When students feel that their needs for ability and autonomy are respected in teaching interaction, positive results will be produced. Enable students to fully complete their own role tasks, timely feedback and encourage students to invest more energy in learning, and generate more learning motivation. Only by designing training topics in a simple and gradual way from easy to difficult, can students be led to stimulate themselves to be interested in C language programming. If they are interested, their learning efficiency and programming level will be improved.

#### **4.3. Use Easy Examples to Explain Abstract Concepts and Algorithms**

Many concepts in computer programming are abstract and difficult for students to understand. Therefore, some appropriate and concise metaphors should be used to let students understand the algorithms of abstract concepts[4].

For example, many students can't understand "variables", maybe they can compare variables with containers, which can hold different types of substances. When two variables need to exchange contents with each other, it is obvious that the two containers cannot exchange directly, so a third "container" needs to be introduced. Pointer is also a relatively abstract concept, which allows students to use mailbox to analogy pointer. To send a letter to a mailbox, of course, you must first know the address number of the mailbox, so the pointer points to a specific address before sending data.

The C language is a structured programming language. It realizes arbitrary structured programming by using only three basic structures: sequence, selection and circulation. In order to let students understand these three basic structures, we can take the daily life of students as an example. The daily work and rest schedule of the school is a sequential structure. Almost everyone makes choices every day, such as ordering food in the restaurant. The curriculum timetable of each semester reflects a cycle, once a week. Such a simple and popular explanation of the basic structure of structured programming will help students deepen their understanding of the logic design of programming.

#### **4.4. In View of Individual Differences, Adopt Positive Strategies Based on Encouragement**

Considering the strong practicality of this course and the different characteristics of students' foundation and hobbies, we should pay attention to teaching students according to their aptitude and adopt different teaching methods according to their progress<sup>[5]</sup>. Because most of the students have not studied computer courses before, they not only lack interest, but also fear difficulties psychologically, and their self-confidence is obviously insufficient.

We should praise and encourage the backward students for their progress. It is necessary to help students gradually overcome their fear of difficulties and weariness in the learning. Every time they successfully modified a program, they will improve their programming ability. Through every step of progress, they can build self-confidence. Only in the process of constantly

correcting errors can they improve their programming level. Training topics should also be from simple to deep. The key is to improve students' logical thinking ability, ability to correct mistakes and abstract thinking ability to solve practical problems through typical topics. For the students who have made rapid progress, praise their progress and encourage them to try to solve some complex problems so that they can have a sense of achievement. The learning class is divided into several learning groups, and the students with faster progress are the group leaders. They are responsible for helping the students with slower progress to correct the errors in the program, and improving their self-drive in the process of mutual help.

## 5. Support Students to Improve Their Learning Motivation and Innovation Ability By Participating in Science and Technology Competitions

Under the organization of several professional teachers, our college has established an intelligent association, which attracts a large number of freshmen interested in intelligent control to participate in the association every year. Under the guidance of teachers, the C language programming level and single-chip application ability of these freshmen have been rapidly improved. Then, they are encouraged to organize teams to participate in various science and technology competitions at all levels, support them to realize their innovative ideas, and compete with excellent peers in the country. These students not only improve their programming level efficiently and rapidly, but also have far more practical and innovative abilities than other students. As participating in various competitions has also broadened their horizons, these students' interest in learning professional knowledge has also been greatly improved.

## 6. Conclusion

In the tide of new engineering construction, in order to cultivate talents with strong application ability, it is necessary to strengthen practical education. This paper discusses some methods of combining internal and external driving forces to stimulate students' internal driving force in the teaching of C language programming. Although some results have been achieved, it needs to be further improved in the future teaching.

## Acknowledgments

The 14th batch of teaching reform and research project of Taishan University, "Online and Offline Integrated Teaching Reform of the C Programming Language Course Based on OBE Concept" (Project No.: JG202127).

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