

Analysis of the Micro-market Environment for STEM Education Based on the Porter Five-Force Model

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Abstract: In the Internet age, STEM education is quietly changing teaching and learning. However, the idea of education reform of STEM integration has sparked controversy after it was introduced to our country. Based on the PEST and Porter Five Forces models, this paper analyzes the macro-micro environment of STEM education, aiming to analyze China's current situation of STEM education, as well as its advantages and disadvantages, so as to actively build a STEM education system suitable for China's national conditions.

Keywords: STEM, Education, Micro market environment.

1. Introduction

The advent of the Internet era further promotes teaching to break through the limitations of time and space, promote the dual revolution of teaching and learning, create a wallless campus for many teachers and students, and gather massive knowledge resources, provide better quality, diversified and personalized learning support, promote the relatively balanced development of education between different regions and groups, and make the concept of educational fairness move from ideal to reality. This background has laid a good foundation for the development of STEM education (Science, Technology, Engineer, Math, for short STEM), and more profoundly changed the way teachers teach and the way students learn.

2. Micro-environmental Analysis Based on Porter's Five Forces Model

2.1. Analysis of existing competitors

STEM educational institutions mainly provide consumers with STEM literacy training courses, comprehensive mathematics, science and other aspects of training, which are in large numbers in the market; However, robotics education institutions provide a wider range of robot education courses, with a small number of institutions. Existing enterprises occupy a certain share of the market.

Nationally and internationally, competition for STEM education is at an early stage. Operators should grasp the rules of the industry cycle and provide highly competitive STEM education services to win the opportunity. Therefore, the institution can rely on their own targeted curriculum and quality services in the market segment to form a differentiated competitive advantage, specifically for STEM education courses and training, clear market positioning, conducive to teacher advantages to innovate product design, improve service quality, establish the company's brand image, occupy market share.

2.2. Analysis of alternative products

As it stands, the main alternatives to STEM curriculum products are the existing programming education for children and robotics education and training courses. Such pseudo-

STEM education models have gradually developed and spread, but they are not real STEM education and cannot fully educate children. Therefore, we should actively establish a brand image and seize market share through differentiated products and services. In this regard, it is necessary to innovate marketing and promotion methods, publicize the educational products and services concept of the project, accelerate the penetration of STEM education in talent training, and enhance parents' familiarity and recognition of STEM education by disseminating the educational purpose of the project. Make full use of excellent teachers, expand the market through differentiated strategies targeted development of the market, form a brand effect, and reduce the risk of substitution.

The advantages and disadvantages of the internal conditions coexist, while the opportunities and threats of the external environment coexist. In general, education and training institutions should aim to improve students' STEM literacy, cultivate children's hands-on innovation ability, actively develop new curricula and new technologies, and formulate correct competition and development strategies. At the same time, the industry belongs to the education service industry, service quality, educational results which are the fundamental factors that determine the market. It should increase the investment in curriculum research and development and technology research and development, optimize the personnel structure. In the long run, the non-replicability of services is the fundamental guarantee for seizing the market. From a fundamental point of view, services that meet the needs of society and closely follow the pulse of the times have broad prospects for development. Therefore, education and training institutions should expand market share, establish brand image, and form differentiated competitive advantages through correct and appropriate publicity and marketing means.

2.3. Potential market entrant analysis

In the current window period, the education brands are grasping to accelerate the growth, resulting in so many potential market entrants are determined by these aspects: at this stage, China's STEM education industry is still in its infancy, the technical barriers and financial barriers to entry are low, the difficulty of new entrants entering the market is

small, the development is rapid, and the number of potential competitors in the industry will continue to rise. However, the technical requirements and teacher requirements of the industry are high, and the teacher resource barriers and technical barriers for the entrants of the industry have been improved to a certain extent.

Its potential market entrants are mainly the traditional K12 education and training institutions. With the integration of online and offline education has become the future development trend of scientific and innovative education tracks. How K12 institutions face the opportunities and challenges of STEM tracks and follow the development rhythm of STEM tracks? The development of new categories of teaching practices through OMO teaching model has become the focus of many K12 educational institutions.

In the basic education of developed countries such as Europe and the United States, the development of STEM education has been relatively mature, and a sound STEM education system has been constructed. However, as far as the country is concerned, the introduction time of STEM education is relatively short, the popularity is still limited, and the public education system lacks strong support in terms of technology, products, and professional talent resources. Therefore, off-campus training institutions with rich educational resources and flexible teaching forms have become an important driving force for the development of STEM education.

However, in the process of transformation, K12 institutions also face many challenges, such as the lack of talents, for K12 institutions, as a veteran enterprise in the education industry, there is no shortage of management and operation talents, but to transform the STEM education field, it needs special teachers to do support, so there will be pressure on talent reserves. Some institutions have published recruitment information on the recruitment platform, which is focused on the recruitment of programming teachers and teaching and research positions, such as the programming teacher recruited by one institution is mainly responsible for the teaching, research and development of the early childhood programming course, and the children's programming instructor of another institution needs to conduct online live teaching according to the teaching plan, and mentions that children's programming is its new project, the development potential is large, and the salary is considerable. It can be seen that all institutions are working hard to recruit talents to form a strong teaching team to cope with this transformation.

STEM education is a policy-sensitive industry, and the main reason for the slow development in the past is that China's test-taking education is deeply rooted and firmly occupies the mainstream user needs. With the continuous adjustment of the double reduction policy and the relevant policies of quality education, the subject structure and proportion of the education system will be stimulated to change, the importance of STEM education will be improved, and the boundary between STEM education and test-taking education will gradually blur, so as to seize and catch up with the current market share of test-taking education. The importance of the policy will inevitably affect the science education market for children and adolescents at a young age.

K12 institutions entering the STEM track will also greatly improve the level of competition in the STEM track, and the influx of a large number of talents will also improve the average level of the industry and accelerate the pace of industry development. Therefore, the future of this market has

broad prospects and a large number of potential competitors. In addition, powerful related enterprises, research institutions, and entrepreneurial teams may become potential rivals, but the industry's teacher resources and operational barriers to entering the market have increased, and the threat of new entrants is low.

2.4. Bargaining power analysis of customers

In a new era and new context, parents have begun to pay more attention to the quality training of children's "independent development" and "social participation". Emerging categories such as socialization literacy and emotional intelligence training, children's financial and business education have also received more and more attention.

Parents' bargaining power over STEM products is weak, mainly determined by the following factors:

Faculty strength is the most concerned factor for the surveyed users, accounting for 65.5%. Price or value for money has become the least valued factor, accounting for only 39.5%. As society attaches more and more importance to education, price is no longer the main factor in measuring education products or services, and users are more inclined to pursue STEM education products with higher professionalism and higher educational value.

According to the statistics of the "2020 China Quality Education Industry White Paper", up to 56.4% of parents believe that "children grow up healthy and happy, and at the same time have their own skills and hobbies. These results are the best". There are also 18.1% of parents who believe that "social competition is fierce, and children should learn as much knowledge as possible".

The parent generation has higher environmental requirements for the quality education and training industry. What they need is that the children are not disturbed by spam information and the inferior training institutions which could promote the training environment. They look forward to having a safe and comfortable classroom and expect children to correctly understand the world and have a different idea to solve problems. They expect children to be able to cooperate with their partners and form friendship. They hope that the child's growth trajectory can be visualized. However, generalized social training cannot provide children with inquiry-based and tutor-based teaching, and assembly line teaching is difficult to cultivate children's four qualities. Therefore, STEM education needs a brand with rigorous teaching management, open learning atmosphere, and high visualization of students' growth trajectory.

In terms of education spending, 34.8% of parents believe that as long as there is an effect, it is okay to spend more; 30.6% of parents believe that education costs should be done according to their ability, which is based on the premise that their children could live well. The concept states that "as long as there is an effect, it is okay to spend more". The older the child, the more parents agree.

Children's training funds are from parents, which means that the economic dependence is very strong. In order to make up for the gap between the rich and poor brought about by the difference in social education and training resources, parents will inevitably invest a lot of money. But this does not mean that the market can easily have consumers. When the proportion of total family income which is invested by the parents is larger, lots of parents will screen for the internet to choose the most cost-effective training institution for their

children. Reasonable price of the training institution is undoubtedly a huge attraction for most families. At the same time, parents have very high requirements for the quality of training and service, and they hope that their children can participate in the training that suits them and can contact the knowledge with a relaxed and pleasant mood. STEM education with its own diversification, comprehensive and interesting advantages obtains students, parents and schools' recognition. With the acceptance of STEM education continues to improve, the user's willingness to recommend and pay is obvious, which means that the market has a huge consumption potential.

2.5. Suppliers' bargaining power

As the direction of the transformation of many educational institutions and an emerging track in the context of quality education, the staffing of teachers is extremely important. Through analysis, it can be concluded that the current bargaining power of the STEM industry is weak, and in the current window period, the medium-sized education brands are stepping up to accelerate their growth. The weak bargaining power of suppliers is determined by these aspects:

(1) The overall level of China's STEM education teaching staff is not high. The source of STEM teachers is limited to teachers or education graduates. The number of teachers selected from a single source is limited, which is difficult to meet the demand.

(2) What is most lacking in STEM education in China is technology and engineering education, and there is no corresponding curriculum in the original normal colleges, so there are almost no technical engineering teachers in schools.

(3) STEM industry norms have been upgraded, and teacher qualification certificates are urgently needed. According to the planning of integrated teacher resources in the "China STEAM Education White Paper" and the "China STEAM Education 2029 Innovation Action Plan", STEM teachers need to have professional literacy, and these old Instructors must be trained in the future. There are two ways to train teachers. One is now more common. Teachers learn and prepare course content on their own according to foreign courses and teaching methods. This way lacks unified standards, and the professional level of teachers cannot be guaranteed; The second is that teachers participate in professional training institutions and get certificates recognized by the state and society, which can not only ensure the professionalism of teachers, but also bring higher curriculum experience to students and parents. The policy promotes the landing of STEM education system and standards. In the future high-demand market situation, more teachers will choose to participate in training to obtain certificates to prove their strength and improve their

competitiveness, so the landing of corresponding qualification certificates is also a necessary direction for policy development.

(4) According to the market for teacher qualification certificates, the market space for STEM qualification examinations is huge. Under the tightening of supervision, the trillion-dollar training institution market also means that the market space for teacher qualification certificate training is huge. As a result, training institutions with training qualifications and certificates will see a huge customer flow.

3. Conclusion

In summary, the development of STEM education has certain opportunities, but it still faces many challenges. STEM education has brought profound changes to traditional classroom teaching. Through the joint efforts of all sectors of society, STEM education integrates the teaching content of different disciplines, so it is to be student-centered system. It is like to build a pathway oriented to solving practical problems and teach them in the classroom. Through STEM education, students are promoted to develop and cultivate their knowledge ability and physical fitness, more internationally, compete new practical compound talents.

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