Problems and Countermeasures in the Implementation of STEAM Education in Middle Schools in the Internet Era

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Abstract: This paper mainly discusses the problems and countermeasures in the implementation of STEAM education in secondary schools in the Internet plus era. Based on the analysis of the current situation of STEAM education, this paper puts forward a series of countermeasures, including improving teachers' quality, perfecting teaching facilities, innovating teaching methods and strengthening practical teaching. I hope this study can provide useful reference for promoting the healthy development of secondary school STEAM education.

Keywords: Internet +; Secondary Education; STEAM Education; Problems; Countermeasures

1. Overview of STEAM Education in Middle Schools in the Internet Plus Era

1.1 Connotation and characteristics of STEAM education

STEAM represents five fields: Science, Technology, Engineering, Arts, and Mathematics, and is an educational concept that values practice and interdisciplinary integration. STEAM education focuses on cultivating students' comprehensive quality in these areas, enhancing their innovation ability and solving practical problems. It has the following characteristics:

Interdisciplinary: STEAM education emphasizes the intersection and amalgamation of knowledge in different fields, and guides students to solve practical problems with multidisciplinary knowledge through project learning.

Practicality: STEAM education pays attention to students' practical operation, requires students' participation, applies theoretical knowledge to practical operation, and trains students' practical ability and problem-solving ability.

Innovation: STEAM education encourages students to think creatively and diversely, advocates finding new problems in the process of solving problems, putting forward new plans, and cultivating students' innovative consciousness and ability.

Teamwork: STEAM education focuses on teamwork, requires students to cooperate with each other, exchange ideas, share experience, cultivate students' communication skills and team spirit.

1.2 Importance of STEAM education in secondary schools in the Internet plus era

In the Internet plus era, the rapid development of information technology has had a profound impact on education. The combination of Internet technology and STEAM education can provide more abundant learning resources and practice opportunities for middle school students and improve their comprehensive quality and innovation ability. The following are the importance of STEAM education in secondary schools:

2. Current Situation of STEAM Course in Secondary Education

2.1 It is difficult to develop and implement the curriculum

Observing from the way of introduction, the current STEAM educational institutions and teachers are carrying on the second development to the foreign curriculum resources and the establishment system, or take own understanding and the experience as the foundation, this has brought many problems. Because of the high cost of purchasing courses abroad, courses in China are generally designed and implemented on the basis of technical tools, most of which are technical courses, and most of which are used as extensions to information technology courses, technology creation courses, such as Scratch graphical programming tools, open source hardware, 3D printing, etc. Although this course is very important, in a sense, it narrows the coverage of STEAM course, making it difficult for students to really understand the great influence and promoting effect of STEAM education on the development of core quality and improvement of academic achievements. Therefore, teachers have no way to integrate STEAM education into the national compulsory courses, nor can they integrate it into the teaching of schools, let alone integrate it into the teaching of schools, especially the combination of science and technology courses with humanities and arts courses, so as to improve students' innovative application ability.

2.2 Lack of teachers and high requirements for teachers

Because STEAM education in many middle schools is still in its infancy, most of the teachers who teach STEAM in primary and middle schools are teachers of science, information technology, etc. In STEAM education, it is necessary to integrate the knowledge of various specialties into the curriculum and teaching. At home, schools buy all kinds of STEAM education products, also increase the burden of teachers. Because many of these products come with complementary courses and learning platforms, schools need dedicated, trained teachers to teach the course. But, the enterprise's product often does not conform to the school actual teaching need completely, the teacher also needs to carry on the second development to it, therefore time-consuming. In addition, STEAM education is quite different from the traditional teaching methods. It pays more attention to students' active exploration and cooperative learning, and emphasizes the cultivation of students' creative and practical abilities. Therefore, teachers engaged in STEAM education need to constantly learn and update their educational concepts and teaching methods, which is also a challenge.

3. Solutions to the Problems in the Application of STEAM Course in Middle School Education

3.1 Rational allocation and adjustment of school funds

First of all, we should take the initiative to apply for STEAM project funds, and appropriate allocation of funds within the school. The introduction and development of STEAM course can be divided into two stages: purchasing mature courses abroad and applying relevant teaching contents independently. Therefore, schools should focus on these two stages in the use and allocation of funds. We can allocate part of the funds to send teachers with relevant professional knowledge to study and research abroad, so that they can have more understanding of the application of STEAM in foreign countries and the overall research and development mode, and collect and accumulate a large number of data and cases to analyze and consider, so as to facilitate the future work of schools. Based on this point, when introducing foreign curriculum resources and content, schools should take a reasonable and prudent attitude, that is, schools should not blindly imitate or apply foreign mature curriculum system. To achieve this goal, we must carry out a deeper level of training of teachers and teachers for the corresponding configuration.

3.2 Building a professional and qualified teaching staff

At present, STEAM educational institutions are mainly based on the needs of the market to carry out the construction of the education system and the ability of teachers. However, this practice deviates from the general intention of school education and the teaching environment. Therefore, in the relevant professional skills and knowledge training, teachers must be timely thinking and digestion, and finally to form their own STEAM education ideas and understanding of STEAM education. For teachers who already work in the workplace, frontline teachers should be encouraged to actively communicate with university research experts to obtain relevant theoretical training, so that their ideas can be fully released. A teacher can learn and be able to teach many subjects at once. At the economic and political level, teachers are encouraged to engage in practical activities and integrate them into STEAM education, providing teachers with adequate teaching resources and facilities. STEAM education and training for in-service teachers can be carried out both online and offline. STEAM training resources, such as college teachers, STEAM tutors and overseas excellent cases, will be put on the learning platform of classroom, blue cloud class and cloud class to provide opportunities for primary and secondary school teachers to learn theories. In the context of the big data era, a cloud class was created using the mobile course APP and the WiFi network as vehicles, where teachers were able to upload the produced teaching videos and related materials to the cloud class database and push them to students to learn new knowledge before class [5].

3.3 Reasonable creation of STEAM learning space

First of all, are the students willing to restrain their individualized needs to match the team's behavior in STEAM activities? The answer is yes. Although high school students have formed independent personality concept, they are usually aware of the importance of team goals and are willing to control their individual needs in order to achieve team goals. Teamwork is essential in STEAM curriculum activities, because only in teams can the integration and application of interdisciplinary knowledge be better realized. As a result, students often realize that they need to make concessions for the sake of the team, but that doesn’ t mean they need to give up their interests and hobbies.

Then, since the middle school students in the school education environment basically adhere to the thinking characteristics of the traditional education mode and take "learning knowledge, doing exercises and exams" as the fixed process of learning, when the STEAM

course enters the students' field of vision in a new form, can they successfully change from the previous theoretical learning mode to the practical ability teaching mode proposed by STEAM education? Regarding this question, needs to consider middle school student's adaptability and to the new thing acceptance degree. Although the traditional education mode plays a dominant role in school education, with the development of the times and the reform of education, more and more educators begin to realize the disadvantages of the traditional education mode and actively explore new education mode. Therefore, when the STEAM curriculum enters the student's field of vision in a brand-new form, as long as the educators can do a good job in guiding and guiding the work, the students will be able to change from the previous theoretical study mode to the practical ability education mode.

3.4 Focus on process evaluation findings

In the context of the development of modern education mode, the application of STEAM education concept has a great impact on the teaching objectives of middle schools. Schools have a new definition of the concept of "quality education".Therefore, the evaluation of STEAM teaching should be diversified and comprehensive, not only from the students' test scores, but also through the process of evaluation to reflect the real role of STEAM teaching. Compared with the traditional summative assessment, the process assessment can evaluate the students' achievements and emotions in their daily study. This kind of evaluation can not only motivate students to complete the learning task, but also give full play to the role of students and teachers' guidance.

With the support of Internet technology, teachers can simulate real life environment and test students' personal quality in many ways, so as to intuitively experience the effect of STEAM teaching. In addition to the traditional evaluation content such as classroom attendance, learning skills standards, teachers can also use more diverse teaching evaluation methods, comprehensive activities evaluation, work evaluation. At the same time, STEAM teaching helps teachers to optimize the problems by analyzing the problems in class, and pays attention to the evaluation of theoretical knowledge and humanistic quality.

Conclusion

In the context of the Internet plus era, improving the quality of STEAM education in middle schools is of great significance for cultivating students' comprehensive quality and innovative ability, this paper puts forward some countermeasures such as strengthening teaching facilities, improving teachers' quality, innovating teaching methods and strengthening practical teaching. These countermeasures have strong operability and effectiveness in practical application, and can provide strong support for promoting the healthy development of STEAM education in middle schools. However, this study is only a preliminary study, the future of STEAM education in secondary schools need more in-depth study to continuously improve the quality and effectiveness of education.

References

[1] Lun G , Meng Q .Problems and Countermeasures of Mental Health Education of College Students under the Background of Big Data[J].Kuram ve Uygulamada Egitim Bilimleri, 2018, 18.

[2] Wen L .Labor Education in Primary and Secondary Schools in the New Era Based on Modern Information Technology[J]. Contemporary Education Studies (Photo), 2021(011):005.

[3] Alagoz N, Keskinkili A. The relationship between internet and game addiction and the levels of physical activity of the secondary education students[J]. Medicine Science | International Medical Journal, 2022.

[4] Lu H .Problems and Countermeasures of Archives Management of Secondary Colleges in Internet Times[C]//International Conference on Social Science and Higher Education. 2019.