

An Intelligent Teaching Mode Based on STEAM Education Concept - A Survey of Some Schools at Grassroots in China

JiaBei Tang^{1a}, Bo Li^{2b} (Corresponding)

{ jiabei.t65@rsu.ac.th^a, 1605469319@qq.com^b(Corresponding). }

Rangsit University, Bangkok Thailand¹, Nanchang Institute of Technology, JiangXi China²

Abstract. STEAM education theory is currently a hot topic in international pedagogy research. With the advancement of science and technology and the development of the times, diversified education models will be the trend in the future. In recent years, more and more regions begin to develop the STEAM education model, encouraging qualified regions to actively explore interdisciplinary learning. However, in some areas with relatively backward development, the educational resources and the level of teachers are relatively backward, and it is still difficult to develop STEAM education. The research content of this paper investigates some representative regional schools in China. Based on the actual situation, a teaching model with strong applicability is proposed for the development of intelligent teaching under the concept of STEAM education.

Keywords: Education; Intelligent education; China.

1 Introduction

Since the middle ages of the 20th century, systematic research on Science, Technology, and Society has gradually appeared in the United States in pedagogy. The STEAM education concept composed of Mathematics has become a hot spot in international pedagogy research [1,2]. About research in this subject, the United States is at the forefront and has successful studies in countries such as Europe. However, most developing countries are in the infancy of STEAM education. No matter whether it is in the compulsory education stage or the higher education stage, there is no formation. A STEAM education [3,4]. Because to develop STEAM education needs certain funds and infrastructure conditions, the localization process of STEAM education cannot apply to international research content, and it is necessary to develop a set of STEAM education systems suitable for each country based on the actual situation of each country [5]. Since the 21st century, China has attached great importance to and continued to develop intelligent and information-based education. At present, China's intelligent infrastructure at various stages of education is relatively complete. Most schools are equipped with Laboratory, PC room, Library, linguistics, Gymnasium, etc. Various teaching rooms, with the popularization of smart devices and the continuous improvement of educational resources, provide the basis for the development of STEAM education in China [6,7]. Since 2015, the Ministry of Education of China has also started to promote the development of STEAM education in some provinces and started China's STEAM education curriculum reform. The research content of this paper proposes an educational model by investigating the current

situation of intelligent teaching in the basic education stage in China's county-level regions, understanding the current situation of STEAM education and intelligent education, and exploring the way of development.

2 Current Basic Education in China

In China, a country with a large land area and a large population, basic education often has the characteristics of uneven distribution of educational resources and difficulties in educational reform. Therefore, it is complicated to develop STEAM education under such circumstances, and there are many difficulties to overcome [8]. At present, China's education stage can be divided into four parts, namely preschool education, primary education, secondary education, and higher education. The higher education system is determined by the college entrance examination, which is held once a year and is also a key factor in deciding what college a student enters. From the stage of compulsory education to the advanced stage of secondary education, students are divided into different schools through examinations. Therefore, many scholars and researchers refer to this examination method as examination-oriented education [9,10]. The enrollment method of using examinations to select and divide students can achieve certain results and can cultivate many talents for the rapid construction of the country and the talent service of the society. However, with the continuous development of society, some problems have gradually emerged, such as: 1. Due to the uneven distribution of educational resources, the quality of education in different regions varies greatly, and the educational level of students also varies greatly; 2. Educational reform takes a long time and is slow, and there is relatively little content that schools and teachers can decide on their own. With the continuous development of higher education, the number of teachers in primary and secondary education has improved to a certain extent, and the academic level of teachers has also improved to a certain extent on the whole, but the regional uneven distribution is still serious. The counties studied in this paper. The overall education level of teachers in the first-level areas is much lower than that in cities. Therefore, we can take advantage of the benefits brought by to develop intelligence and develop a set of teaching models with strong applicability in combination with the STEAM education concept to provide new ideas for workers in the basic education stage [11,12].

3 The study

Under the Chinese education system, primary education and secondary education are important parts of students' development. County-level regions are fairly representative administrative divisions in China. Compared with other regions, the county-level regions selected by the research have no special places, the population, and educational resources are at the normal level of compulsory education and have a certain representativeness. This paper selects primary and secondary education workers in the county-level areas of China as the survey objects. Through interviews and questionnaires, teachers and school leaders investigate to obtain the current application of intelligent teaching and STEAM education in China's basic education.

The interviews in the study selected several leaders and teachers from middle schools. The interviews lasted about half an hour and were recorded by audio recording and notes. The interviewees were very active in the conversation, sharing the current popularity of smart

devices on campus and the teaching situation of teachers in the classroom, as well as the interviewees' views on STEAM education and intelligent teaching. Intelligence in this study includes computers, mobile phones, software programs, network teaching, and much other modern equipment.

The questionnaire survey adopts the form of voluntary participation. Questionnaires distribute to some in-service teachers in 6 basic education schools in the region. A total of 127 answer data collect, 2 of which record as invalid data because the answer time is too short, and 125 copies of valid data.

4 Findings

Under the continuous promotion of the government and the leadership of the education department, the school classrooms of basic education in China equip with all-in-one computers with display screens, scanners, computers, and other equipment, and the laboratories and computer rooms on campus can support the completion Some basic teaching experiments. Therefore, 26% of teachers satisfy with the smart devices on campus, and half of the teachers think the smart devices on campus are enough but need to improve (fig.1).

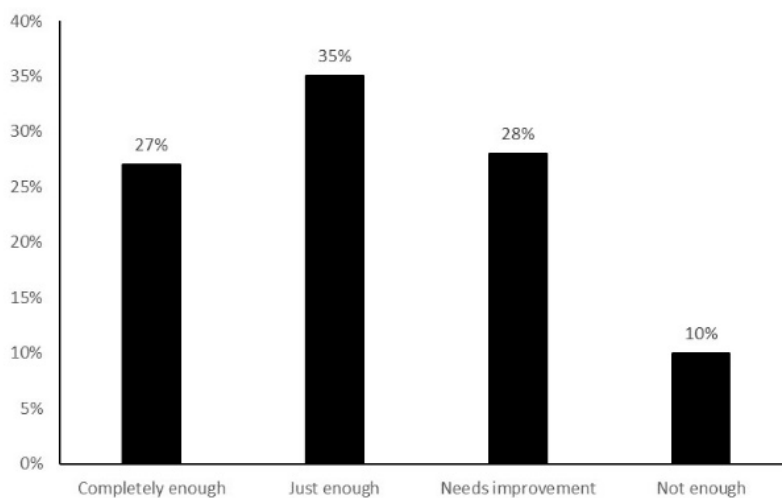


Fig. 1. Current need for intelligent devices

From the perspective of the use time of smart devices, nearly half of the teachers use smart devices in the teaching of the whole class, 34% of teachers use smart devices for more than half of the time in the classroom, and only a very small number of teachers do not use smart devices in the classroom. This shows that teachers currently use a relatively high degree of intelligence in classroom teaching, which is also the positive effect brought about by the complete equipment of intelligent infrastructure and teacher training in the education department (Fig.2).

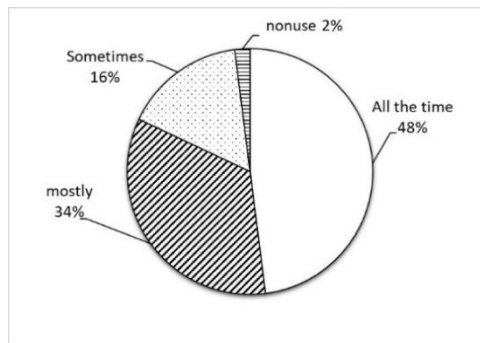


Fig. 2. Time spent using smart devices in the classroom

From the perspective of software and applications, 83% of teachers use PPT in the teaching process, 33% of teachers use teaching animation, and only 2.5% use MOOCs, video teaching, and audiobooks. of teachers use VR/AR devices. This shows the current classroom teaching activities are only relatively simple applications, and the content media involved are mainly PPT (Fig.3).

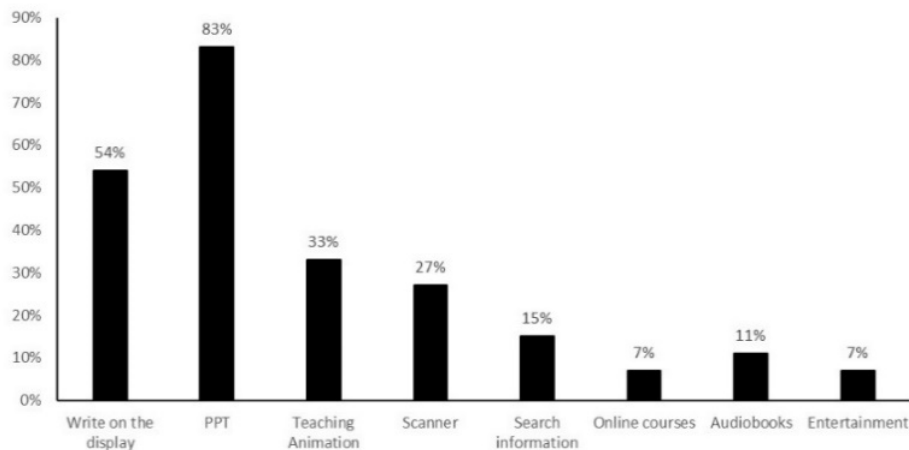


Fig. 3. Utilization rate of intelligent applications in the classroom

About curriculum design and classroom preparation, 35% of teachers design intelligent teaching content in the curriculum for a long time, and half of the teachers sometimes design intelligent teaching content in the curriculum. This is more important. It shows that intelligent teaching in the teacher's curriculum design, which is of great help to make an intelligent teaching curriculum (Fig.4).

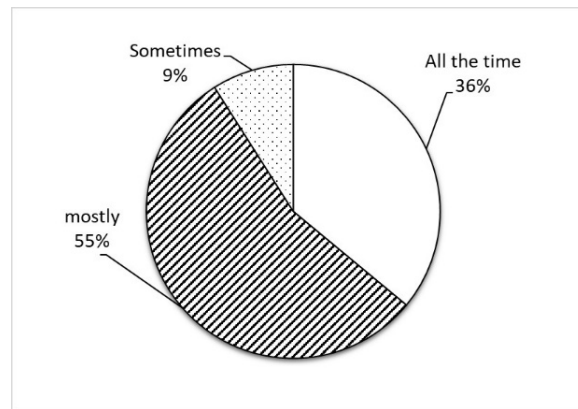


Fig. 4. Intelligent part of curriculum design

The survey also specifically learned about the popularity of STEAM education. More than half of the teachers have never heard of STEAM teaching, 40% of the teachers have only heard of it but are not familiar with it, and only 6% of the teachers understand the specific content of STEAM teaching. This shows that in China's basic education, the popularity of STEAM education is still very low, and neither education managers nor teachers have fully studied the concept of STEAM education (Fig.5).

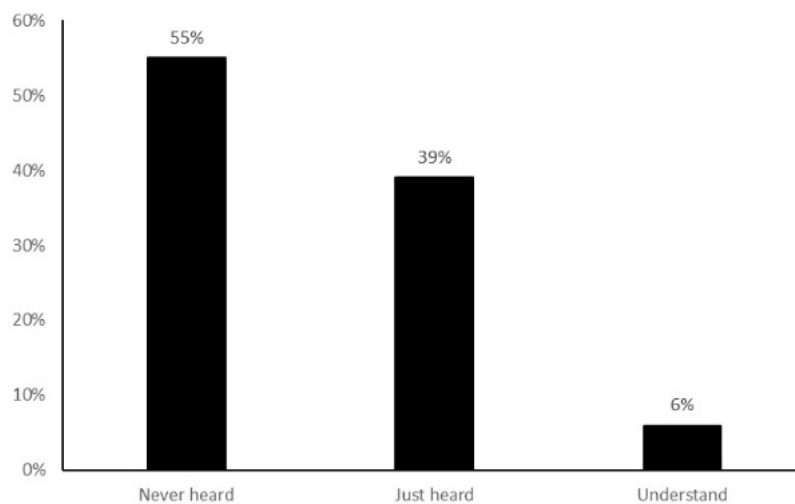


Fig. 5. Understanding of STEAM education

Judging from teachers' learning attitudes towards intelligent teaching, most teachers are willing to spend time and energy on learning digital and information-based teaching, but a large number of teachers do not have time to specialize in learning, and only 38% of teachers feel they have

time to learn related content. Only when educators are willing to learn and develop new educational content can they apply the research content to teaching to achieve results (Fig.6).

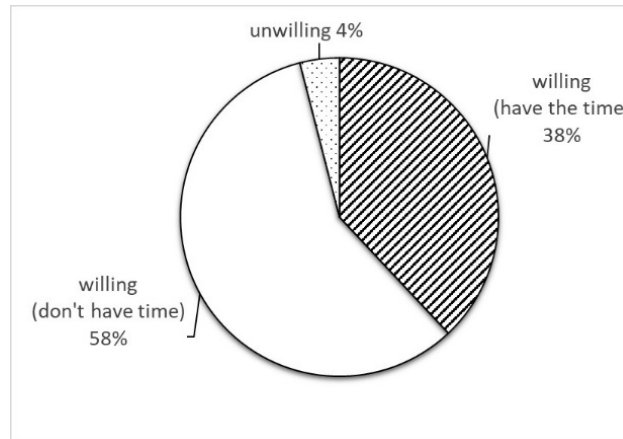


Fig. 6. The enthusiasm of learning intelligent teaching

On the whole, The survey shows that in the stage of basic education in China, the teaching objectives and curriculum content still focus on the examination syllabus, combined with quality education in morality, sports, art, etc., but there is no systematic STEAM education content and intelligent teaching Way. The school's hardware equipment widely use, and teachers' ability to use modern technological equipment is not low, and there are sufficient conditions to meet a certain level of STEAM education. The problem is that teachers do not have enough understanding of STEAM education. The digital teaching content provided by schools and education departments is relatively small and single, and teachers themselves have little room to play. However, most teachers have a positive learning attitude towards intelligent teaching.

5 Conclusions

According to the data, it is not difficult to see that for the stage of basic education in China, the comprehensive level of intelligent teaching is not high at present, and little understanding and application of STEAM education concepts. According to China's current education situation, China's education still focuses on the assessment of the content of the educational syllabus that integrates moral education, physical education, and art, and no systematic STEAM education content.

The development of STEAM education concepts needs to be carried out slowly, so it is difficult to directly integrate mature STEAM education concepts into the curriculum and teaching. It is necessary to use relevant content indirectly to make the teaching model as easy as possible and suitable for basic education in China.

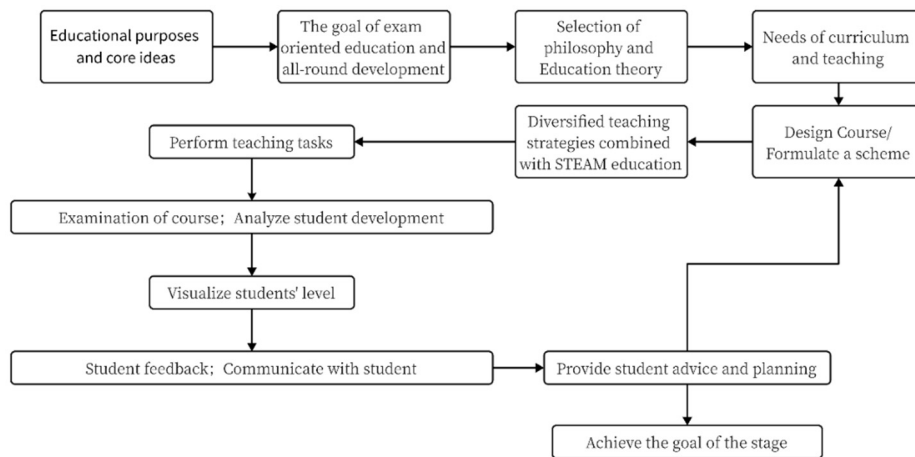


Fig. 7. Model process

To develop STEAM education suitable for putting Chinese education can have a certain logical basis. For example, this is a curriculum and teaching model that includes a partial cycle (Fig.7). First, the core idea of education is more habitually proposed in Chinese education. According to the national and social requirements Combined with the policy documents in the environment then and the traditional culture of the school, put forward short content that is conducive to develop students. Many people compare China's education system with exam-oriented education. For STEAM education, exams are just a way of teaching and evaluation. It is necessary to change the educational philosophy that exams determine success or failure. It is necessary to align the purpose of exam-oriented education with the purpose of comprehensive quality-oriented education. Combining and proposing phased goals. Choose correct philosophical thoughts and educational theory knowledge as the basis, and in this part, you can use STEAM educational theory to conduct overall and overall analysis and generalization. Make full use of available facilities such as school rooms and equipment, and arrange courses and teaching needs reasonably. The design of courses and formulate teaching plans base on intelligent teaching. Through different teaching methods from traditional methods, we make full use of modern equipment such as computers, all-in-one display screens, and mobile phones, and explore high-quality information-based network content. Especially in regions with relatively weak educational, the teaching platform on the Internet can use to reduce the gap between schools and teachers in different regions, which has the advantage of intelligent teaching. From the perspective of disciplines, different disciplines should make different use of STEAM teaching concepts to formulate teaching strategies to achieve interdisciplinary learning and multi-disciplinary integrated learning, which involves to develop individualized methods for each different student, from Science, Technology, Engineering, Arts, and Mathematics develop diversified teaching strategies for each discipline. Based on the specific arrangement of courses and teaching content, plan the time and rest reasonably, and complete the teaching tasks according to the progress. During the teaching process, students test and evaluated periodically. Each evaluation is an opportunity for students to evaluate and analyze, rather than to determine the future of students through the results of exams and evaluations. Students who cannot understand their problems after the exam can use computer software to visualize the data results

of the exam and evaluation, which can promote students' in-depth understanding of their self-learning. Then supplemented by teacher-student communication, accept teaching feedback from students, and further provide students with learning suggestions and plans. In this way, find the defects in teaching and curriculum, and the cycle returns to the stage of curriculum design/planning, and the quality of education continuously improve with the help of intelligent teaching, to achieve the purpose of training, and students can also learn in this way fully realize self-development.

Statement. Consistent contribution of all authors to the article

References

- [1] Blanca and Carlos,J.(2018).Augmented reality for STEM learning A systematic review.*Computers & Education*,S0360-1315(18)30102-7.
<https://doi.org/10.1016/j.compedu.2018.05.002>
- [2] China Academy of Educational Sciences. (2017).*China STEM Education White Paper*[White paper]. <https://www.doc88.com/p-9929654523882.html?s=rel&id=1>
- [3] Lyn D,J.(2016).STEM education K-12 perspectives on integration.*International Journal of STEM Education*,3(1):3.<https://doi.org/10.1186/s40594-016-0036-1>
- [4] Ministry of Science and Technology of China. (2017). *Scientific Quality Benchmark of Chinese Citizens*. http://www.gov.cn/gongbao/content/2016/content_5103155.htm
- [5] STEM. (2020, August 22).In *Wikipedia*.
https://en.wikipedia.org/wiki/Science,technology,engineering,and_mathematics
- [6] Yu ShengQuan and Hu Xiang,J.(2015).STEM Education Concept and Interdisciplinary Integration.*ModeOpen Education Research*,21(04):13-22.<http://doi.org/10.13966/j.cnki.kfjyyj>
- [7] Maeda, J. (2013). Stem+ art= steam. *The STEAM journal*, 1(1), 34.
- [8] Ge, X., Ifenthaler, D., & Spector, J. M. (Eds.). (2015). Emerging technologies for STEAM education: Full STEAM ahead. Springer.
- [9] Khine, M., & Areepattamannil, S. (2019). Steam education. Springer, 10, 978-3.
- [10] Shatunova, O. (2019). STEAM as an innovative educational technology. *Journal of Social Studies Education Research*, 10(2), 131-144.
- [11] Ge, X., Ifenthaler, D., & Spector, J. M. (2015). Moving forward with STEAM education research. Emerging technologies for STEAM education: Full STEAM ahead, 383-395.
- [12] Affifi, R. (2019). Between will and wildness in STEAM education. In *Why Science and Art Creativities Matter* (pp. 79-99). Brill.